

VOL. XXXIII. — No. 10.

OCTOBER 1956.

Monthly  
Bulletin  
of the International  
Railway Congress Association  
(English Edition)



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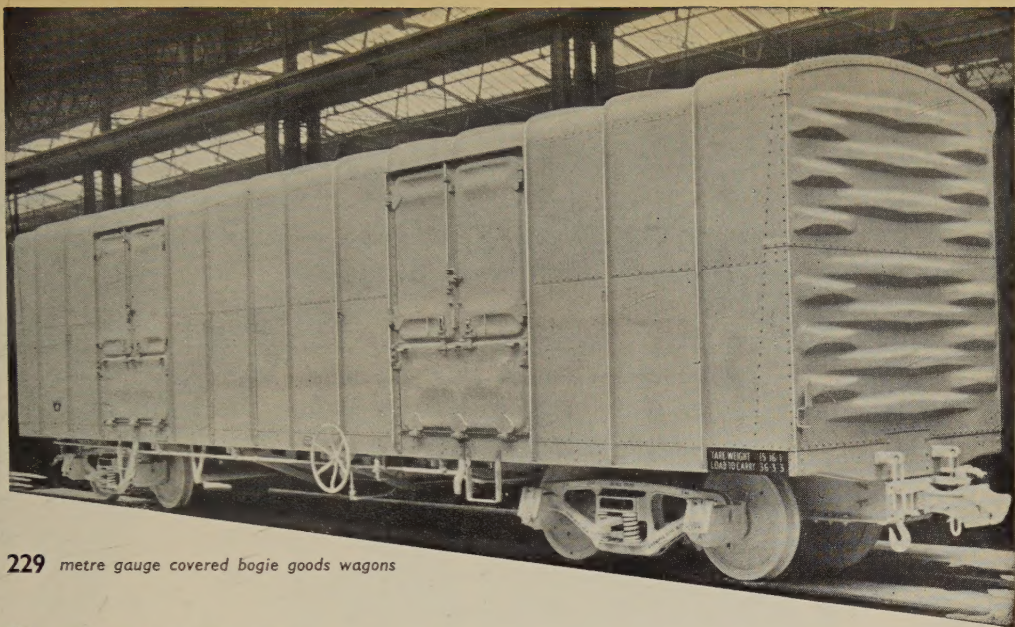
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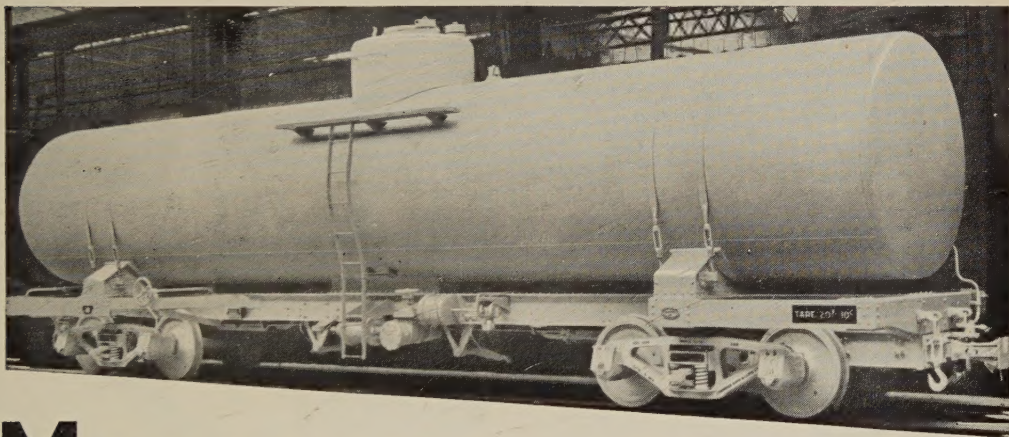






229 metre gauge covered bogie goods wagons

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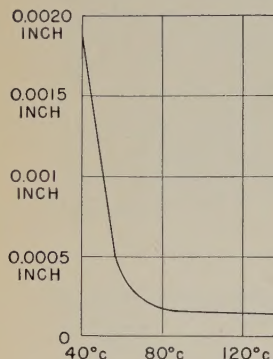


# REDUCE DIESEL OPERATING COST INSTALL VAPOR 4915 HEATER



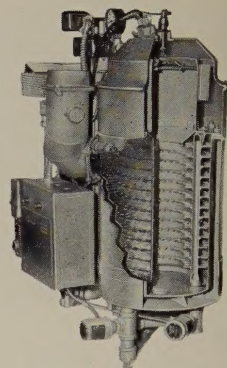
Automatically keeps Diesel coolant at operating temperature to reduce operating cost and maintenance. Burns same fuel as Diesel engine.

**SAVES FUEL** — eliminates idling. Automatically keeps Diesel safe, warm, with cylinders fully expanded, ready for the road. (4915 burns 2 to 4.7 liters fuel per hour, depending on weather conditions.)



Cylinder wear in relation to wall temperature--inch/1000 miles

**SAVES ON MAINTENANCE** — extends service life, because Diesel need never be started cold. Reduces wear, dilution of crankcase, oil, sludge formation.



Section view 4915

4915 also installed on Diesel Railcars for same purpose, and to supplement temperature of Diesel coolant for car heating.

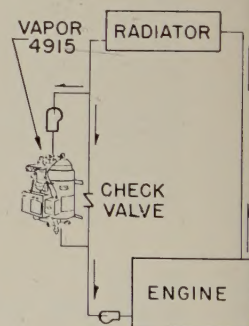
## 4915 SPECIFICATIONS

Rated output	31,500 K-Cal/hr (125,000 BTU/hr)
Weight installed (with circulating pump)	130 Kilos (285 lbs.)
Dimensions overall (vertical model)	92 x 45 x 61 cm (36" x 18" x 24")
Nozzle size	1.25 GPH (US) (4.7 liter/h)
Drive motor	1/3 Horsepower

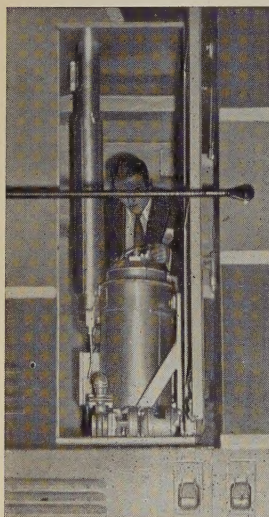
Combustion System : Pressure atomized fuel oil.  
Constant electric spark ignition. Forced draft blower.

Control Method : Automatic operating and safety controls. Constant forced circulation of Diesel coolant, with 4915 burner cycled ON-OFF under control of thermostat.

Mounting : three types : Vertical floor mounting, horizontal floor, horizontal suspended (ceiling or under car).



Coolant piping sketch



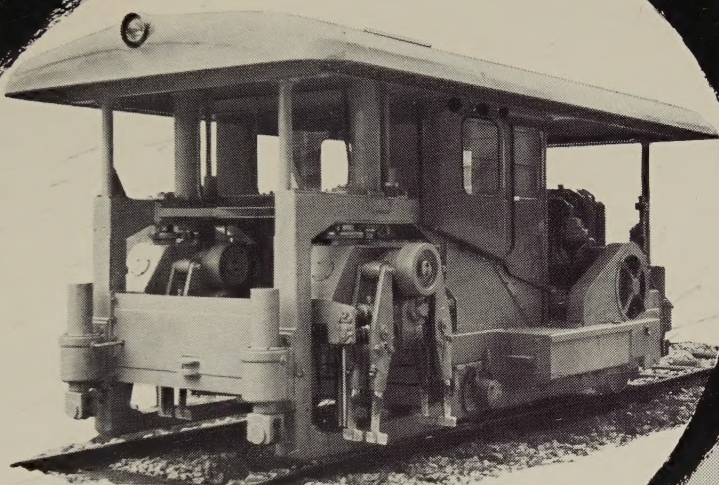
Locomotive installation  
vertical 4915

For complete information write to :

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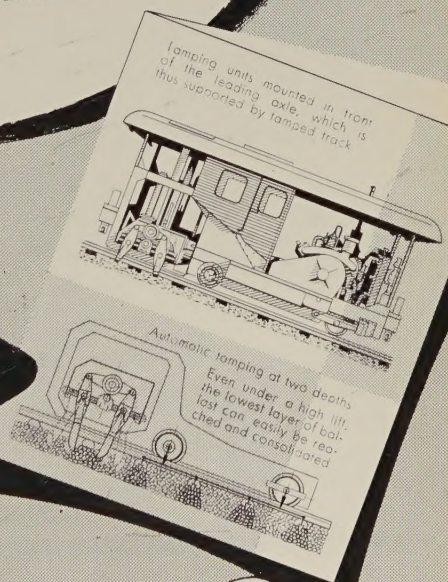


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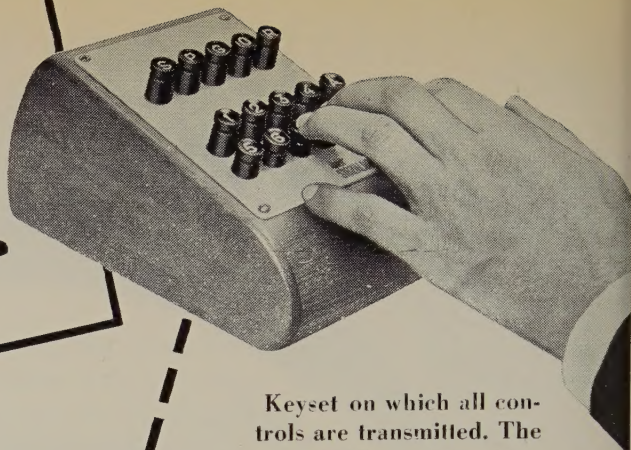
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● station crews can be reduced

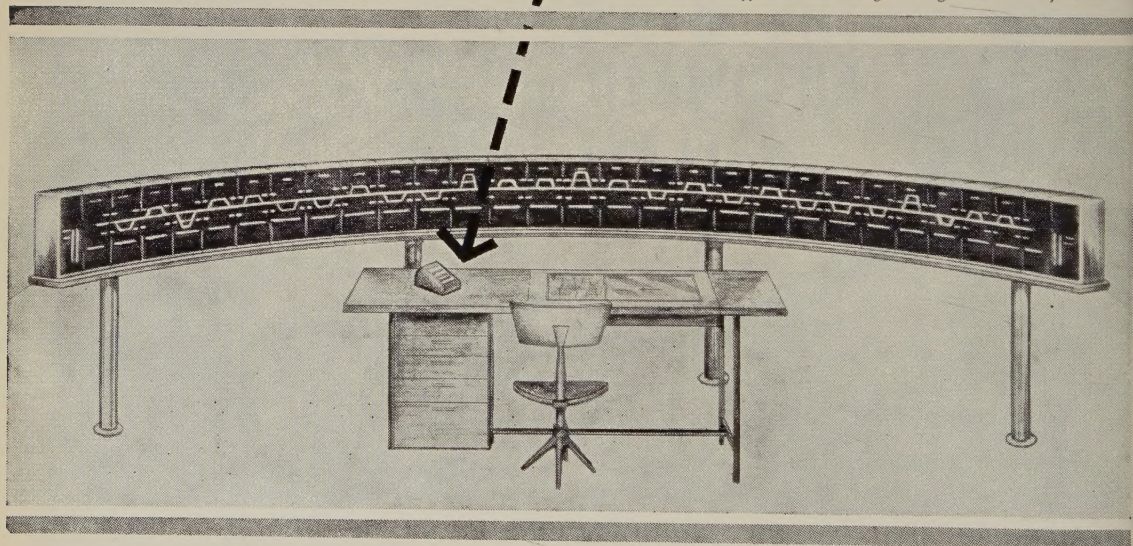
Keyset on which all controls are transmitted. The concentration of the control equipment to a single position implies numerous advantages. Chief among these are that the train dispatcher

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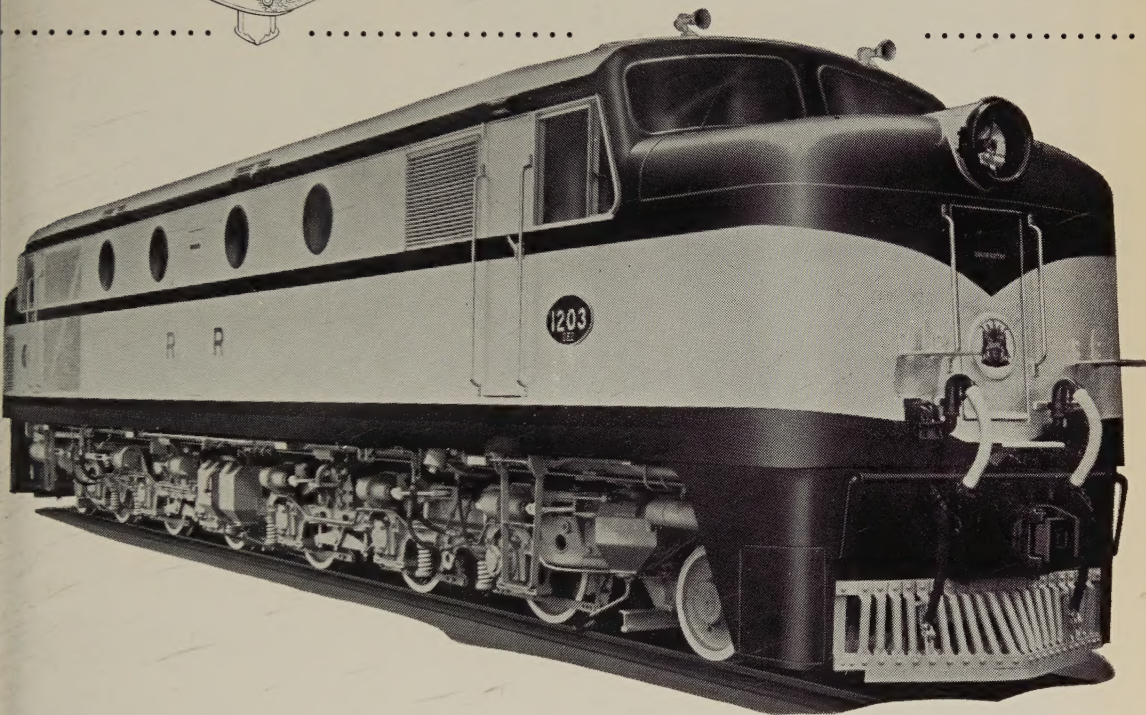
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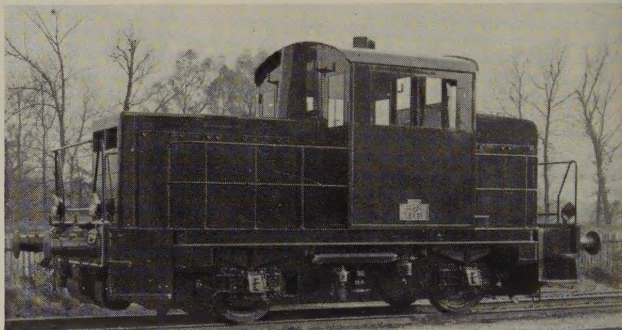
**WAGONS**

★

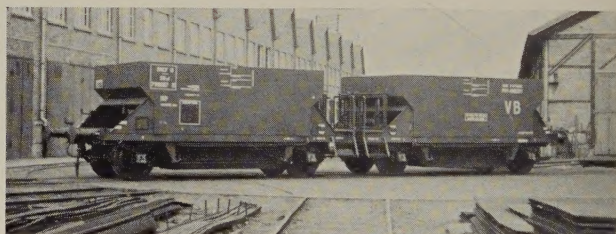
**TRACK EQUIPMENT**



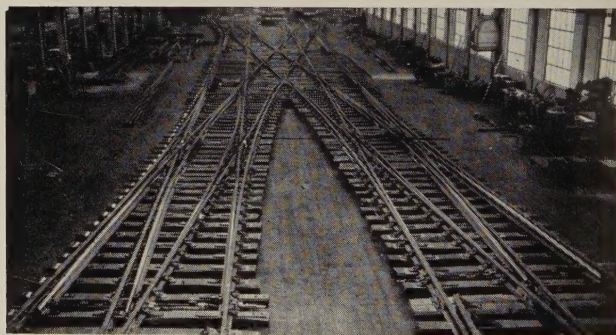
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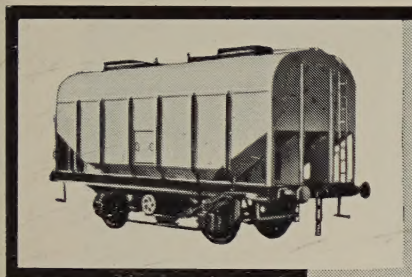


CROSS-OVER CONSTITUTED BY 4 DOUBLE  
JUNCTION CROSSINGS



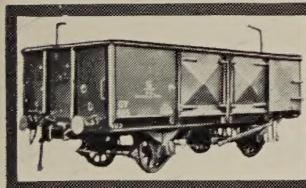
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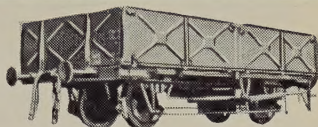
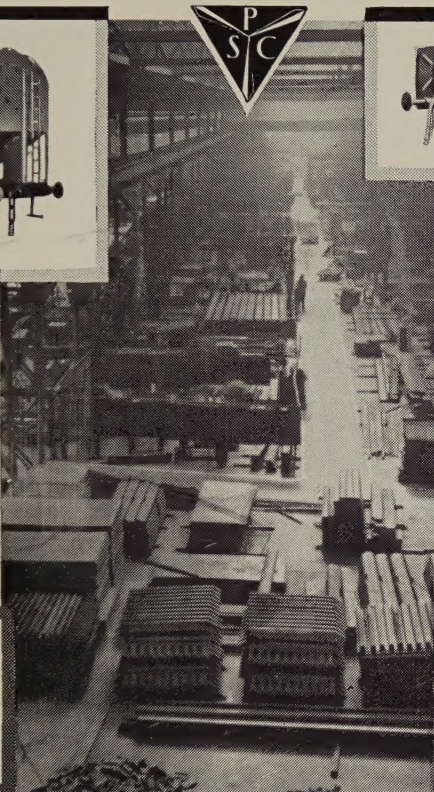
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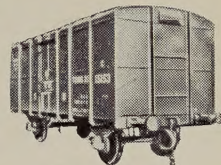


22-ton G.Y. type Wagon as used  
by the Victoria Government  
Railways, Australia

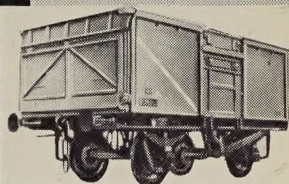
V. J. M. Hopper type Wagon  
with Drop Bottom Door  
as used by Queensland  
Government Railways, Australia



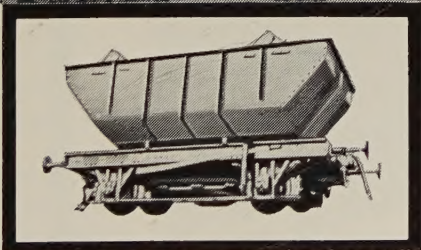
F.J.S. Low-sided Open type  
Wagon as used by Queensland  
Government Railways, Australia



Broad gauge covered Wagon  
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Indian Railways



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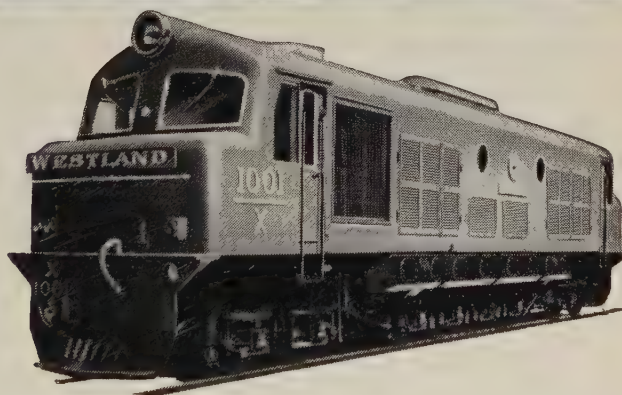
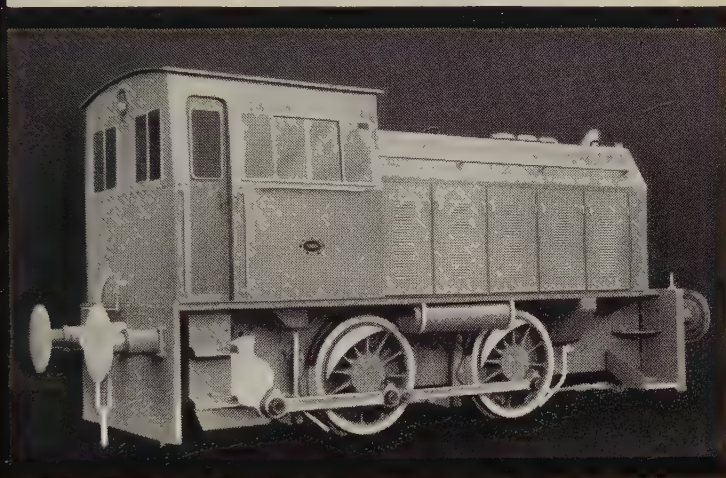
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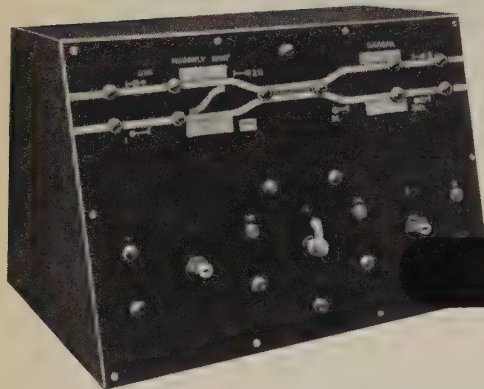
C401



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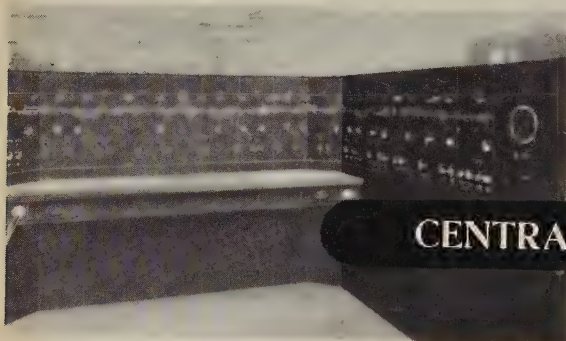
Panel at Hooghly Ghat, India



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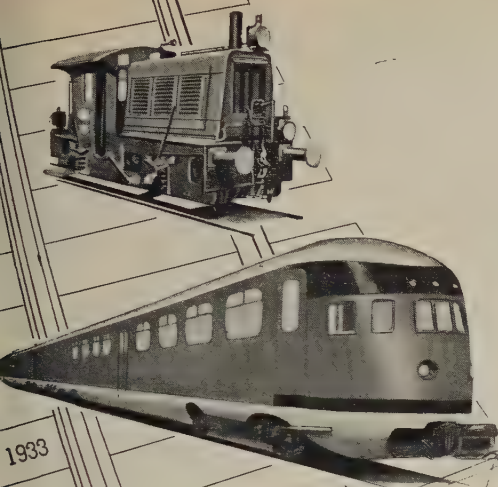
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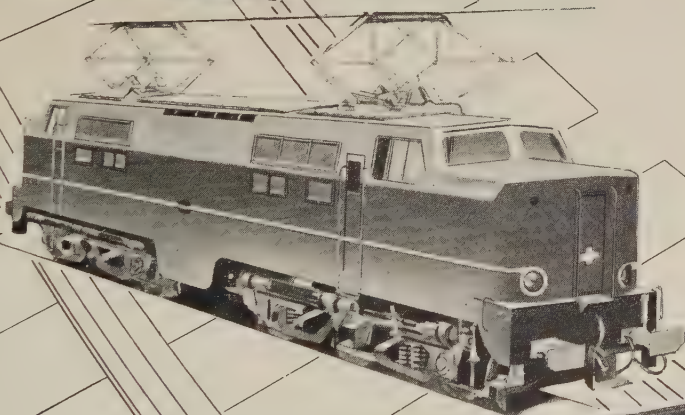


1933

1934

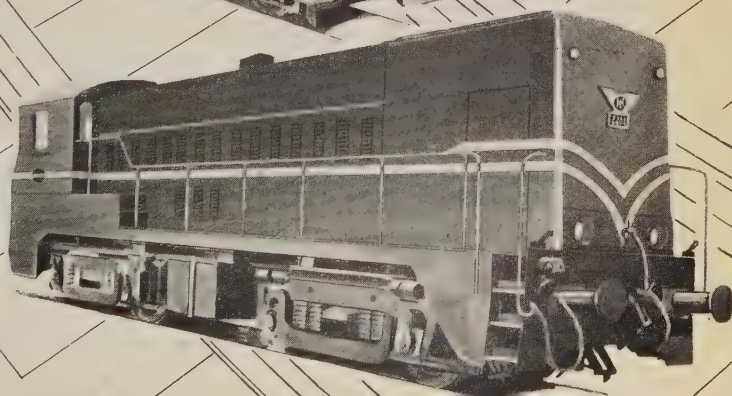


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HENGELO

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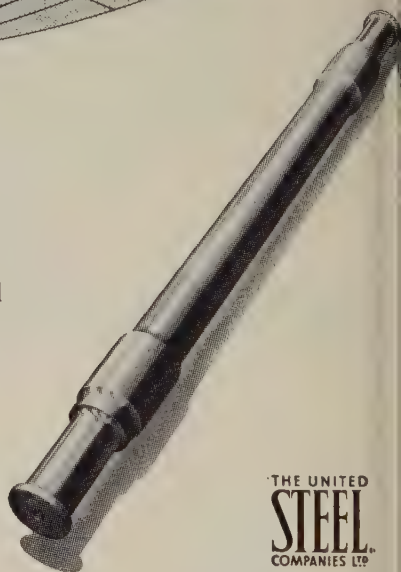
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# MONTHLY BULLETIN

## OF THE

# INTERNATIONAL RAILWAY CONGRESS ASSOCIATION

### (ENGLISH EDITION)

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## LIBRARY OF THE Permanent Commission of the International Railway Congress Association

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Works in connection with railway matters, which are presented to the Permanent Commission are mentioned in the « Bulletin ». They are filed and placed in the library. If the Executive Committee deems it advisable they are made the subject of a special notice. Books and publications placed in the reading room may be consulted by any person in possession of an introduction delivered by a member of the Association.

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*An edition in French is also published.*



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**BULLETIN**  
OF THE  
**INTERNATIONAL RAILWAY CONGRESS**  
ASSOCIATION  
(ENGLISH EDITION)

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**INTERNATIONAL RAILWAY CONGRESS ASSOCIATION**

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*Enlarged Meeting of the Permanent Commission at The Hague-Scheveningen*

(4th to 6th June, 1956.)

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In our *Bulletin* for July last, we have published a report on the Meetings of the Permanent Commission of the International Railway Congress Association, which took place on the 4th and 6th June 1956, at Scheveningen, in connection with the Enlarged Meeting of the Permanent Commission held at The Hague-Scheveningen in the beginning of June last. In the same issue appeared also a short report on the various ceremonies which were organised during this Session.

In the present issue, we publish the List of Participants to the Meeting, as well as the résumé of the proceedings in Sections and Plenary Meeting, duly completed by the Final Summaries adopted for the Questions on the agenda of the Meeting.

The Rules and Regulations of the Association and the List of Questions on the agenda of the future Congress of the Association to be held in Madrid (1958) are also included.

---



# LIST OF PARTICIPANTS

## TO THE HAGUE-SCHEVENINGEN MEETING.

- \* Members of the Permanent Commission.
- \*\* Assistants to Members of the Permanent Commission.

\* Dr.-Ing. A. **Attisani**, Chef du Service du Matériel et de la Traction des Chemins de fer de l'Etat italien.

\* Sir John **Benstead**, C. B. E., Deputy Chairman of the British Transport Commission.

\*\* J. L. **Harrington**, Chief Officer (Marine & Administration), British Transport Commission.

\*\* F. Ch. **Margetts**, Chief Operating Superintendent, British Railways, Scotland.

\* David **Blee**, Traffic Adviser, British Transport Commission.

\*\* J. R. **Pike**, Chief Commercial Officer, British Railways Division, British Transport Commission.

\* Ch. **Boyaux**, Directeur Général de la Société Nationale des Chemins de fer Français. (*Excused.*)

\*\* H. L. F. **Lefort**, Directeur de la Région Est de la Société Nationale des Chemins de fer Français.

\*\* M.-A. **Lamiral**, Ingénieur en Chef, Chef de la Division Mouvement Traction à la Direction du Matériel et de la Traction de la Société Nationale des Chemins de fer Français.

\* Dipl.-Ing. A. **Brill**, Ministerialdirektor, Leiter der Maschinentechnischen- und Beschaffungsplanungsabteilung der Hauptverwaltung der Deutschen Bundesbahn.

\*\* Dipl.-Ing. F. **Flemming**, Hauptverwaltungsrat der Deutschen Bundesbahn.

\*\* Dr.-Ing. G.-A. **Gaebler**, Hauptverwaltungsrat der Deutschen Bundesbahn.

\* A. **Brouckaert**, Directeur du Service du Matériel et des Achats de la Société Nationale des Chemins de fer Belges.

\*\* S.-J. **Boulanger**, Ingénieur Principal à la Direction du Matériel et des Achats de la Société Nationale des Chemins de fer Belges.

\* O. V. S. **Bulleid**, Chief Mechanical Engineer, Coras Iompair Eireann, Member of Honour of the Permanent Commission of the Association of Railway Engineers.

\*\* L. **Collins**, Assistant Chief Mechanical Engineer, Coras Iompair Eireann.

\*\* D. **Herlihy**, Chief Engineer, Coras Iompair Eireann.

\* R. **Claudon**, Inspecteur Général des Ponts et Chaussées, Vice-Président du Conseil d'Administration de la Société Nationale des Chemins de fer Français. (*Excused.*)

\*\* R. **Guibert**, Chef Adjoint de la Direction Commerciale de la Société Nationale des Chemins de fer Français.

\*\* J. H. **Daudemard-Gregnac**, Ingénieur en Chef à la Division du Trafic Marchandises de la Direction Commerciale de la Société Nationale des Chemins de fer Français.

\* Dr. R. **Cottier**, Directeur de l'Office Central des Transports Internationaux par Chemins de fer.

\* T. C. **Courtney**, Chairman of the Coras Iompair Eireann.

\*\* F. **Lemass**, General Manager of the Coras Iompair Eireann.

\*\* M. J. **Hayes**, Secretary, Coras Iompair Eireann.

\* M. **Crem**, Directeur du Service de l'Exploitation de la Société Nationale des Chemins de fer Belges.

\*\* G. **Moulart**, Ingénieur en Chef à la Direction de l'Exploitation de la Société Nationale des Chemins de fer Belges.



- \*\* L. **Devillers**, Ingénieur en Chef à la Direction Electricité et Signalisation de la Société Nationale des Chemins de fer Belges.
- Dr.-Ing. A. **Cuttica**, Vice-Directeur Général des Chemins de fer de l'Etat Italien.
- da Costa **Couvreux**, ancien Président du Conseil Supérieur des Travaux Publics au Ministère des Travaux Publics et des Communications du Portugal, Member of Honour of the Permanent Commission of the Association. (*Excused.*)
- \*\* C. **Manitto Torres**, ancien Ingénieur en Chef de l'Exploitation des Chemins de fer de l'Etat Portugais (Sud et Sud-Est).
- h. **Dargeou**, Directeur Général Adjoint de la Société Nationale des Chemins de fer Français.
- \*\* A. **Lamarque**, Chef de l'Exploitation de la Région du Sud-Ouest de la Société Nationale des Chemins de fer Français.
- \*\* R. **Vernier**, Ingénieur en Chef, Chef du Service de l'Exploitation de la Région de l'Ouest de la Société Nationale des Chemins de fer Français.
- de **Aguinaga**, Director General de Ferrocarriles, Tranvías y Transportes por Carretera (Spain).
- \*\* F. **Turell**, Ingénieur, Inspecteur du Réseau National des Chemins de fer Espagnols.
- \*\* G. **Torres-Quevedo**, Inspecteur Régional de la 15<sup>e</sup> Démarcation (construction des chemins de fer), Inspecteur Général des Ponts et Chaussées (Spain).
- J. Q. **den Hollander**, Président des Chemins de fer Néerlandais.
- \*\* D. J. **Wansink**, Directeur Général des Chemins de fer Néerlandais.
- \*\* J. **Wessels Boer**, Directeur Général des Chemins de fer Néerlandais.
- f. **De Vos**, Directeur Général de la Société Nationale des Chemins de fer Belges, President of the International Railway Congress Association.
- f. **Dias Trigo**, Directeur des Services d'Exploitation et du Matériel de la Direction des Transports terrestres au Ministère des Travaux Publics et des Communications du Portugal.
- \* G. H. **Dijkmans van Gunst**, Directeur Général des Transports au Ministère des Transports et du Waterstaat (Netherlands).
- \* E. **Dorges**, Secrétaire Général Honoraire aux Travaux Publics et aux Transports, Délégué Général du Ministre pour les Affaires Internationales au Ministère des Travaux Publics et des Transports (France).
- \*\* A. **Doumenc**, Directeur Général des Chemins de fer et des Transports au Ministère des Travaux Publics et des Transports (France).
- \* Sir John **Elliot**, Chairman of the London Transport Executive.
- \*\* L. J. **Boucher**, Signal Engineer, Southern Region, British Railways.
- \* Prof. Dr.-Ing. E. **Frohne**, Erster Präsident der Deutschen Bundesbahn.
- \* J. M. **Garcia-Lomas**, Directeur du Réseau National des Chemins de fer Espagnols.
- \*\* J. M. R. **Simó**, Ingénieur en Chef Adjoint du Matériel et de la Traction du Réseau National des Chemins de fer Espagnols.
- \*\* F. **Wais San Martin**, Directeur Adjoint du Réseau National des Chemins de fer Espagnols.
- \* L. **Gehorsam**, Directeur de l'Institut Scientifique des Recherches et des Essais Ferroviaires des Chemins de fer de l'Etat de Pologne.
- \*\* J. **Chmielewski**, Chef du Département du Mouvement à l'Institut Scientifique des Recherches et des Essais Ferroviaires des Chemins de fer de l'Etat de Pologne.
- \*\* E. **Kowalski**, Chef de Section au Ministère des Chemins de fer de Pologne.
- \*\* I. **Wencel**, Conseiller Supérieur au Ministère des Chemins de fer de Pologne.
- \* P. **Ghilain**, Directeur Honoraire du Service du Matériel et des Achats de la Société Nationale des Chemins de fer Belges, General Secretary of the International Railway Congress Association and Member of Honour of the Permanent Commission.
- \* J.-M. **Goursat**, Directeur de la Région du Nord de la Société Nationale des Chemins de fer Français.

- \*\* M.-M. **Doudrich**, Ingénieur en Chef, Chef de la Division du Mouvement de la Région du Nord de la Société Nationale des Chemins de fer Français.
- \* R. W. C. **Grand**, General Manager, Western Region, British Railways. (*Excused.*)
- \*\* R. A. **Smeddle**, Chief Mechanical and Electrical Engineer, Western Region, British Railways.
- \* Dr. H. **Gschwind**, Président de la Direction Générale des Chemins de fer Fédéraux Suisses.
- \*\* O. **Wichser**, Directeur Général des Chemins de fer Fédéraux Suisses.
- \* Gamal-el-Din Badawy **Hamdy**, Directeur Général des Chemins de fer de la République d'Egypte.
- \*\* Amin Mohsen **El-Khatib**, Inspector General, Traffic & Goods Department, Egyptian Republic Railways.
- \*\* Mahmoud **Magdy**, Inspector General, Mechanical Department, Egyptian Republic Railways.
- \* Ranald J. **Harvey**, Consulting Engineer, Member of Honour of the Permanent Commission of the Association.
- \* R. **Hoens**, Directeur Général de la Société Nationale Belge des Chemins de fer Vicinaux. (*Excused.*)
- \*\* N. G. **Van Habost**, Ingénieur en Chef à la Société Nationale des Chemins de fer Vicinaux (Belgium).
- \*\* **Valcke**, Ingénieur Principal, Chef de Service à la Société Nationale des Chemins de fer Vicinaux (Belgium).
- \* The Rt. Hon. Lord **Hurcomb**, G. C. B., K. B. E., Chairman, British Transport Commission 1947-53, Member of Honour of the Permanent Commission of the Association.
- \* S. **Isozaki**, Directeur du Service des Affaires Etrangères, Chemins de fer Nationaux du Japon. (*Excused.*)
- \*\* S. **Takeuchi**, Directeur du Mouvement et de la Traction des Chemins de fer Nationaux du Japon.
- \*\* T. **Yagi**, Chef du Service du Budget des Chemins de fer Nationaux du Japon.
- \* Dipl.-Ing. M. **Jacobshagen**, Ministerialdirektor, Leiter der Betriebsabteilung in der Hauptverwaltung der Deutschen Bundesbahn.
- \*\* Dipl.-Ing. G. **Wattenberg**, Hauptverwaltungsrat, Deutsche Bundesbahn.
- \* R. **Kunz**, Directeur de l'Office Fédéral des Transports (Switzerland).
- \*\* A. **Martin**, Chef de Section à l'Office Fédéral des Transports.
- \* Dr. N. **Laloni**, Directeur Général Adjoint des Chemins de fer de l'Etat Italien. (*Excused.*)
- \*\* F. **Santoro**, Inspecteur Supérieur au Service Commercial des Chemins de fer de l'Etat Italien.
- \* U. **Lamalle**, Directeur Général Honoraire de la Société Nationale des Chemins de fer Belges, Member of Honour of the Permanent Commission of the Association.
- \* F. L. **Lehtinen**, Directeur Général Adjoint des Chemins de fer de l'Etat de Finlande.
- \*\* E. E. **Hirvikallio**, Directeur Adjoint au Service de l'Economie et de la Compétitivité des Chemins de fer de l'Etat de Finlande.
- \*\* E. E. **Lamminpää**, Directeur Adjoint au Service du Matériel et de la Traction des Chemins de fer de l'Etat de Pologne.
- \* R. **Lévi**, Directeur des Installations fixes de la Société Nationale des Chemins de fer Français.
- \*\* J. G. **Walter**, Ingénieur en Chef, Chef de la Division des Installations de Sécurité, de Télécommunications et de Caténaires à la Direction des Installations Fixes de la Société Nationale des Chemins de fer Français.
- \* Ing. F. **Marin**, Vice-Directeur Général des Chemins de fer de l'Etat Italien. (*Excused.*)
- \* R. F. **Marriott**, Advisory Engineer, Representative of the New Zealand Government Railways, London.
- \* J. P. **Musquar**, Directeur Général de la Société Nationale des Chemins de fer Luxembourgeois.
- \* G. **Pande**, Chairman, Railway Board, Ministry of Railways, Government of India. (*Excused.*)
- Represented by: P. Ch. **Mukerjee**, Member, Engineering, Ministry of Railways (Railway Board), Government of India.
- \*\* R. G. **Da Costa**, Railway Adviser to the High Commissioner for India in Great Britain and Railway Consultant to the Director General, Railway Board, India.



- \*\* M. Srinivasan**, Senior Railway Inspecting Officer, Railway Board of India, Office of the Railway Adviser to the High Commissioner for India in Great Britain.
- A. Peña Boeuf**, Président du Conseil d'Administration du Réseau National des Chemins de fer Espagnols. (*Excused.*)
- \*\* M. Marcias**, Sous-Directeur, Chef du Département Commercial du Réseau National des Chemins de fer Espagnols.
- Dr.-Ing. V. Perrone**, Inspecteur Général Supérieur Honoraire du Ministère des Transports (Italy).
- \*\* Dr.-Ing. V. Bongarzone**, Chef du Secrétariat du Sous-Secrétaire d'Etat pour les Transports, Ministère des Transports (Italy).
- A. Porchez**, Directeur Général Adjoint de la Société Nationale des Chemins de fer Français.
- \*\* P. Ravenet**, Ingénieur Principal, Chef de la Division Entretien du Matériel Moteur de la Direction du Matériel et de la Traction de la Société Nationale des Chemins de fer Français.
- \*\* G.-H.A. Renault**, Ingénieur Principal à la Division de l'Entretien des Engins Moteurs du Service du Matériel et de la Traction de la Région Sud-Est de la Société Nationale des Chemins de fer Français.
- X. Remy**, Directeur des Chemins de fer Fribourgeois et Président de l'Union d'Entreprises Suisses de Transport.
- \*\* H. Born**, Secrétaire Général de l'Union d'Entreprises Suisses de Transport.
- \*\* P. Buchli**, Directeur de la Rhätische Bahn (Switzerland).
- General Sir Brian Robertson**, Bart., G. C. B., G. B. E., K. C. M. G., K. C. V. O., D. S. O., M. C., Chairman, British Transport Commission.
- \*\* Major-General L. Wansbrough-Jones**, C.B., C. B. E., Secretary General to the British Transport Commission.
- Dr. M. Schantl**, Directeur Général des Chemins de fer Fédéraux Autrichiens.
- \*\* Dr. E. Bezpalec**, Ministerialrat, Leiter der Abteilung für Allgemeine Angelegenheiten der Internationalen Eisenbahnverbände und für Organisation, Österreichische Bundesbahnen.
- \* Dr. F. Schelp**, Präsident der Deutschen Bundesbahn.
- \*\* Dr. jur. H. Kreul**, Direktor der Hauptverwaltung der Deutschen Bundesbahn.
- \* P. E. N. Skov**, Directeur Général des Chemins de fer de l'Etat Danois. (*Excused.*)
- \*\* Th. Jensen**, Directeur des Services Commerciaux des Chemins de fer de l'Etat Danois.
- \*\* S. Thorning Christensen**, Directeur du Service des Voies et Bâtiments des Chemins de fer de l'Etat Danois.
- \* H. E. Stokke**, Directeur Général des Chemins de fer de l'Etat Norvégien. (*Excused.*)
- Represented by:* **L. Tveten**, Directeur Général Adjoint des Chemins de fer de l'Etat Norvégien.
- \*\* O. Bakken**, Directeur de la Région de Trondheim, Chemins de fer de l'Etat Norvégien.
- \*\* T. Johannessen**, Directeur Adjoint, Chemins de fer de l'Etat Norvégien.
- \* Ing. J. Švigel**, Directeur de l'Institut Ferroviaire de la Direction Générale des Chemins de fer Yougoslaves.
- \*\* J. Reb**, Chef de la Section Exécutive au Service du Mouvement de la Direction Générale des Chemins de fer Yougoslaves.
- \* J. C. L. Train**, Member of the British Transport Commission.
- \*\* H. C. Johnson**, Assistant General Manager (Traffic), Eastern Region, British Railways.
- \*\* L. H. K. Neil**, Continental Traffic and Shipping Manager, Eastern Region, British Railways.
- \* J. Tuja**, Secrétaire Général de l'Union Internationale des Chemins de fer. (*Excused.*)
- \*\* P.-D.-H. Bonnefon**, Ingénieur à la Société Nationale des Chemins de fer Français, Conseiller Technique Supérieur à l'O. R. E. (Office de Recherches et d'Essais).
- \*\* P.-A. Rousseau**, Chef des Services Exécutifs de l'Union Internationale des Chemins de fer.
- \*\* W. Reck**, Chef du Service Technique (Matériel et Traction) à l'O. R. E.

\* E. G. J. **Upmark**, Directeur Général des Chemins de fer de l'Etat Suédois.

\*\* A. **Sjöberg**, Directeur des Services Financiers et des Recherches Economiques des Chemins de fer de l'Etat Suédois.

\*\* A. **Karsberg**, Directeur et Ingénieur en Chef aux Chemins de fer de l'Etat Suédois.

\* F. **Perez Villamil**, Directeur Adjoint du Réseau National des Chemins de fer Espagnols.

\*\* J. **Fernandez-Prida y Garcia Mendoza**, Ingénieur en Chef de la Voie et des Travaux au Réseau National des Chemins de fer Espagnols.

\*\* J. **Ramon de Urcola y Ansola**, Ingénieur en Chef, Chef du Service d'Etudes au Département de l'Exploitation du Réseau National des Chemins de fer Espagnols.

\* W. **White**, President, Delaware & Hudson Railroad Corporation. (*Excused.*)

\*\* G. **DeCamp Hughey**, Vice-President in Charge of Operations (*retired*), Delaware & Hudson Railroad Corporation.

\* Lt-Col. G. R. S. **Wilson**, Chief Inspecting Officer of Railways, Ministry of Transport and Civil Aviation (Great Britain).

\*\* Brigadier Ch. A. **Langley**, Inspecting Officer of Railways, Ministry of Transport and Civil Aviation (Great Britain).

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(Union of Soviet Socialist Republics.)

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J. F. E. M. **Aghina**, Chef de la Division Presse des Chemins de fer Néerlandais.

*Assistants :*

Mr. **Loos** and Miss **Van T'Hooft**.

#### REPORTERS

L. **Antoine**, Directeur du Service Commercial à la Société Nationale des Chemins de fer Belges.

R. **Biais**, Ingénieur en Chef, Chef du Service du Matériel et de la Traction de la Région du Sud-Ouest de la Société Nationale des Chemins de fer Français.

Ir. V. J. M. **de Blicq**, Ingénieur Principal de la Signalisation des Chemins de fer Néerlandais.

R. F. **Harvey**, Chief Operating and Motive Power Officer, British Transport Commission.

Dr. O. **Maier**, Hauptverwaltungsrat, Referent für Internationales Eisenbahnfrachtrecht und für Internationale Güter- und Tiertarife der Hauptverwaltung, Deutsche Bundesbahn.

Ing. A. **Riggio**, Inspecteur en Chef du Service de la Voie des Chemins de fer de l'Etat italien.

Ing. E. **Tenti**, Inspecteur en Chef au Service du Mouvement des Chemins de fer de l'Etat Italien.

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**G.-M. Bureau**, Agent d'Etudes Administratives Principal à la Direction Commerciale de la Société Nationale des Chemins de fer Français.

**R. H. Kitching**, Assistant to Chief Officer (Marine and Administration), British Transport Commission.

**TECHNICAL SECRETARIES**

**F. Baeyens**, Ingénieur en Chef à la Société Nationale des Chemins de fer Belges.

**J. Dubus**, Ingénieur en Chef Honoraire de la Société Nationale des Chemins de fer Belges.

**P. Schoonjans**, Ingénieur à la Société Nationale des Chemins de fer Belges.

# INTERNATIONAL RAILWAY CONGRESS ASSOCIATION

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*Enlarged Meeting of the Permanent Commission at The Hague-Scheveningen*

(4th to 6th June, 1956.)

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## Summary of sectional proceedings.

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### SECTIONS I and III. – Way and Works – Working.

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[ 656 .21 & 656 .25 ]

#### QUESTION 1.

**Research on the economic usefulness and the technical opportunity to install a third track, serving for common use (banalisation), in addition to sections of double track lines with heavy traffic, instead of installing two double track lines on such sections.**

**Consequences of the installation of a third track for use in either direction on the conditions necessary to insure the safety of train movements.**

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#### Preliminary documents.

Report (*America [North and South], Australia [Commonwealth of], Burma, Ceylon, Egypt, India, Irak, Iran, Republic of Ireland, Japan, Netherlands, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, United Kingdom of Great Britain and Northern Ireland and dependent overseas territories*), by V. J. M. DE BLIECK. (See *Bulletin* for February 1956, p. 95.)

Report (*Austria, Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Den-*

*mark, Ethiopia, Finland, France and French Union, Germany [Federal Republic], Greece, Hungary, Indonesia, Italy, Luxembourg, Poland, Portugal and overseas territories, Rumania, Spain, Switzerland, Syria, Turkey, Viet-Nam and Yugoslavia*), by E. TENTI and A. RIGGIO. (See *Bulletin* for April 1956, p. 323.)

Special Report, by E. TENTI and A. RIGGIO (See *Bulletin* for May 1956, p. 405).

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## SECTIONAL DISCUSSION.

Meeting of the 4th June 1956 (afternoon).

*Chairman : Mr. David BLEE, Traffic Adviser, British Transport Commission, Member of the Permanent Commission of the Association.*

— The meeting began at 3.15 p.m.

The PRESIDENT welcomed the Delegates and told them that the Permanent Commission had suggested for the constitution of the Bureau of the Section :

as *Vice Presidents* :

Mr. J. DE AGUINAGA, Director General Ferrocarriles, Tranvias y Transportes por Carretera (Spain), member of the Permanent Commission of the Association, and

Dr. M. SCHANTL, General Manager of the Austrian Federal Railways, Member of the Permanent Commission of the Association;

as *Principal Secretary* :

Mr. A. MARCHAL, Ingénieur Principal, Société Nationale des Chemins de fer Belges;

as *Secretaries* :

Mr. G. PINSON, Inspecteur à la Division des Etudes d'Exploitation de la Région Ouest de la Société Nationale des Chemins de fer Français, and

Mr. E. G. BRETNALL, Assistant Signal Engineering Officer, British Railways;

— *The Section signified its approval.*

The PRESIDENT, in the name of the Assembly, regretted the absence of Mr. C. K. BIRD, General Manager, Eastern Region, British Railways, prevented from attending and presiding the meeting by ill health, and hoped he would soon recover.

He stressed the importance of the problem being dealt with and congratulated the Reporters and Special Reporters for the considerable work they had accomplished.

He then called upon Mr. TENTI, *Special Reporter*, who summed up his report, drafted with the collaboration of Mr. RIGGIO.

Mr. MARCHAL, *Principal Secretary*, then read *Summary No. 1 of Chapter A : Traffic considerations to be taken into account in the study of the various means available to increase the capacity of a double track line.*

1. When on a double-track line with a very heavy traffic, it becomes necessary to contemplate increasing the number of movements or of substantially improving the operating position, it is expedient at the outset to study all the means of increasing the efficiency of the two tracks in order to take full advantage of the potential offered by the line; for instance, improvement of the track lay-out in the stations, provision at these stations of interlocking installations, achieving greater uniformity in speeds, provision of automatic block signalling with short sections, provision of complete signalling schemes, two-way working (banalisation) on one or both tracks of the line.

The efficiency of two-way working requires that, at certain periods, the density of the traffic in the two directions shall be unequal, either in respect of the number of movements or in the duration of line occupation; it is necessary that traffic peaks in one direction occur at the periods marked by an almost complete lull in traffic in the other direction.

The PRESIDENT invited those present to make any comments they thought advisable about this summary.

Mr. MOULART (*Belgian National Railways*), would be willing to suppress the second part of the second paragraph, which he did not think corresponded with actual facts; a lull in the traffic in the opposite direction to the peak traffic did not seem essential to him in order to assure the efficiency of two-way working; in his opinion, the idea of an unequal amount of traffic was sufficient.

The PRESIDENT also did not quite agree with the sentence in question. He would like the expression « it is necessary that traffic peaks », which is too absolute to be made more elastic by saying « the advantages are increased when traffic peaks ».

Mr. TENTI explained the meaning to be given to the expression « lulls in the traffic » on a double track line with two-way working; if there are two trains running in the same direction at the same time this implies that there is no traffic in the other direction : this is what must be understood by « lulls in the traffic ». In a summary dealing with the effectiveness of two-way working, the last part seems to be a useful way of making the precise meaning clear.

Mr. WAIS SAN MARTIN (*Spanish National Railways*) thought that the last sentence made the text of the summary clearer and more precise.

Mr. RIGGIO (*Reporter and Special Reporter*) pointed out that it is sometimes necessary, to deal with peak traffic in a given direction, to create a lull in the traffic in the opposite direction : the last point is therefore essential.

The PRESIDENT thought that his suggested amendment might unite the different points of view.

— *The Meeting agreed to the text modified in this way and the new text of Summary 1 is as follows :*

« 1. When on a double-track line with a very heavy traffic, it becomes necessary to contemplate increasing the number of movements or of substantially improving the operating position, it is expedient at the outset to study all the means of increasing the efficiency of the two tracks in order to take full advantage of the potential offered by the line; for instance, improvement of the track lay-out in the stations, provision at these stations of interlocking installations, achieving greater uniformity in speeds, provision of automatic block signalling with short sections, provision of complete signalling schemes, two-way working (banalisation) on one or both tracks of the line.

« The efficiency of two-way working requires that, at certain periods, the density of the traffic in the two directions shall be unequal, either in respect of the number of movements or in the duration of line occupation; the advantages are



increased when traffic peaks in one direction occur at the periods marked by an almost complete lull in traffic in the other direction. »

#### *Summary No. 2 :*

2. In the case where, owing to the volume and characteristics of the traffic, the above mentioned measures would not offer a satisfactory solution, it is necessary to examine from the three view-points of traffic requirements, technical factors and economic considerations, the value of adopting one or the other of the following two solutions : the construction of a third track, or quadrupling.

These two solutions have one factor in common — one track reserved for each direction of movement, allowing a same basic traffic; to compare the two solutions, it is therefore necessary to take into account the movements it is considered desirable to transfer from these tracks.

— *This summary was adopted without discussion.*

#### *Summary No. 3 :*

3. In examining the movements in the one direction over a heavily used section of line, one can have either a mixture of trains of widely varying speeds, a situation characteristic of the majority of railway routes, or groups of trains at close intervals in the same direction, which, independent of differences in speed, occur at the same time on the section. The necessity for using the two tracks for traffic in the same direction arises from the fact that the number of trains running in the peak periods exceeds in time occupation the operating capacity of one track, after due allowance has been made for the necessity of not excessively sacrificing the running of slow trains by holding them for unduly long periods and at frequent intervals.

Variations in the speed of the trains constitute an important factor in requiring on certain sections of line an increase in the number of tracks to allow the overtaking, without stopping, of slow trains by the faster trains.

— *This summary was adopted without discussion.*

#### *Summary No. 4 :*

4. The choice, from the traffic point of view, between the two solutions — « three tracks » or « quadrupling » involves the examination of the characteristics of the traffic at peak periods in the two directions taken together.

Movements can comprise an unbalanced pattern with peaks exceeding the capacity of one track and which occur always in one direction only (either in a permanent direction — up gradient for example — or in opposite directions but at different periods). In this situation the provision of a third track (respectively without two-way working and with two-way working in the second) offers, in principle, a satisfactory solution. Overtaking without stopping is practicable in one direction only if the third track is not equipped for two-way working, or if it is so equipped, it becomes practicable in the two directions but at different moments of time.

On the contrary, if traffic peaks, each exceeding the capacity of one track, occur at the same time in both directions of movement, quadrupling is, in principle, the most likely solution as it alone will allow of overtaking movements at the same time in both directions. With this situation, a third track in common use could be contemplated in certain circumstances and with certain limits of traffic, but it would be necessary to carry out on this track true crossing movements as on a single-track line.

Mr. MOULART wondered if the text could not be relieved by suppressing the first paragraph, as well as the end of the summary after the words : « ...as it alone will allow of... » as these sentences do not add anything to the fundamental idea.

Mr. TENTI agreed that the beginning should be deleted but not the end. This was inspired by the concrete example of the German line Ludwigsburg-Bietigheim : a third track has to cope with a traffic which includes peak traffic in both directions simultaneously; two-way working on the third track resulted in the trouble

experienced with a single track; it is admissible, but four tracks would be preferable. This was the reason for the final portion of the proposed text which might however be lightened by leaving out the phrase: « ...as it alone will allow of overtaking movements at the same time in both directions ».

Mr. JOHNSON (*British Railways*) would like it made clear that the third track can in principle be a satisfactory solution when an existing double track line has become insufficient for the traffic to be dealt with.

The PRESIDENT said that he was of the opinion that the amendment adds greater precision to the text, but does not alter the fundamental idea; he thinks that there is agreement between Mr. TENTI and Mr. JOHNSON on the principle of the paragraph. It is really a matter of language and unless Mr. JOHNSON thinks it absolutely necessary to precise, he would suggest to accept the paragraph as drafted.

Lt. Col. WILSON (*British Government*) asked the Special Reporter if in his opinion the « true crossing movements » to which he refers means that there are laybys of a certain length on the third track which in fact amounts to a fourth track?

Mr. TENTI wished to give the text a more general meaning. Simultaneous peak traffic implies transferring train movements in both directions onto the third track, creating a situation similar to that with a single track. This does not prevent the third track from having certain sidings so that trains can pass each other, but this is not obligatory.

The PRESIDENT wondered if under these conditions the expression « true crossing movements » was not too restricted, and whether mention should be made of the safety measures and the length of the laybys.

Lt. Col. WILSON confirmed that this comments had been correctly understood. He thought however that the first paragraph of the summary might be suppressed as Mr. TENTI has suggested, as well as that part of the sentence: « ...at it alone will allow of overtaking movements at the same time in both directions ».

— *This proposal was adopted and the final text of the summary approved in the following form:*

« 4. Movements can comprise an unbalanced pattern with peaks exceeding the capacity of one track and which occur always in one direction only (either in a permanent direction — up gradient for example — or in opposite directions but at different periods). In this situation the provision of a third track (respectively without two-way working and with two-way working in the second) offers, in principle, a satisfactory solution. Overtaking without stopping is practicable in one direction only if the third track is not equipped for two-way working, or if it is so equipped, it becomes practicable in the two directions but at different moments of time.

« On the contrary, if traffic peaks, each exceeding the capacity of one track, occur at the same time in both directions of movement, quadrupling is, in principle, the most likely solution. With this situation, a third track in common use could



be contemplated in certain circumstances and with certain limits of traffic, but it would be necessary to carry out on this track true crossing movements as on a single-track line. »

#### *Summary No. 5 :*

5. On any track used in one direction only, the *theoretical track capacity* is determined by the time taken to pass through the longest block section as measured in time. In practice, the mixed nature of the traffic (variations in speeds and in the priority of trains) and out of schedule running, as can always arise, make it necessary to regard the *true capacity* as being substantially below (average value 0.7 to 0.8 of the theoretical capacity); time losses occur in actual traffic conditions through the need to give second place to slow and less important trains in relation to the faster and more important trains using the same track (cases of overtaking either as provided for in the timetable or as necessitated by trains running out of course).

Mr. CREM (*Belgian National Railways*) did not understand why the fact that the true capacity was lower than the theoretical capacity should influence the choice between the two solutions of three tracks or four. He would be quite willing to suppress Summary No. 5.

The PRESIDENT recalled the different methods of carrying out investigations. Certain railways were able to approach the examination from the angle of the cost; they arrived at theoretical conclusions which they adjusted in order to take into account various operating factors. Other Railways preferred to confide the preliminary study to traffic department experts who would evolve practical conclusions straight away. The conclusions arrived at on this subject must not leave room for any doubt.

Mr. TENTI stated that the utility of the suggested text would appear in the following summaries.

Mr. CREM accepted the summary, especially because of its interest to readers who were not fully acquainted with these problems.

— *Summary No. 5 was adopted without modification.*

#### *Summary No. 6 :*

6. When a second track is available in one direction, this permits at least of doubling the initial capacity, and, by a careful allocation of the fast and slow trains on the different tracks, it can even lead to a better user of the two tracks considered together; it is for this reason in the case of quadrupling a double track line that the operating capacity can be more than doubled.

Mr. MOULART, whilst agreeing with the principle, would have preferred a better balanced text. First of all, the increase in capacity of a line that is being doubled is defined; then the consequences of having four tracks are deducted. Perhaps three tracks should also be mentioned. Or else Summaries 6 and 7 be combined.

— *As the Meeting agreed, Summary 7 was read.*

#### *Summary No. 7 :*

7. With a third track, the degree of the increase in capacity is related to the nature of the movements using the third track; it varies according to whether these consist either of groups of trains in the one direction at close intervals (the situation most favourable to high capacity) or of numerous movements in the two directions, which in practice gives rise to the difficulties normally met with on single-track lines. For this reason, the increase in capacity with a third track can only be measured in relation to the different

situations and then only approximately; in certain cases it can reach more than half the pre-existing capacity of the line, consequent on the possibility of carefully allocating the fast and the slow trains between the tracks.

Mr. TENTI suggested the following wording for the new Summary 6 intended to replace the former Summaries 6 and 7.

« 6. When a second track is available in one direction, this permits at least of doubling the initial capacity, and, by a careful allocation of the fast and slow trains on the different tracks, it can even lead to a better user of the two tracks considered together.

« With a third track, the degree of the increase in capacity is related to the nature of the movements using the third track; it varies according to whether these consist either of groups of trains in the one direction at close intervals (the situation most favourable to high capacity) or of numerous movements in the two directions, which in practice gives rise to the difficulties normally met with on single-track lines. For this reason, the increase in capacity with a third track can only be measured in relation to the different situations and then only approximately. »

— *This text was adopted.*

*Summary No. 8 (new No. 7) :*

8. In regard to the actual use of the tracks for a given traffic, quadrupling, in principle, allows of a higher degree of specialisation, while on a line with a third track, the necessity to divert trains from one track to another, according to circumstances, and even contrary to the booked working arrangements, is generally more frequent.

The necessity of diverting trains from one track to another, and, in the event, of under-

taking on the track equipped for two-way working true crossing movements, as on a single-track line, makes it essential above all else to provide on the third track a complete and rapid system of regulating, which alone allows of substantial flexibility in working, reflecting itself in an increase in operating capacity.

Mr. WALTER (*French National Railways*) wanted the expression « a complete and rapid system of regulating » made more explicit by mentioning the possibility of making use of télécontrol of points and signals, which will be dealt with in the second chapter on installations.

Mr. TENTI was in favour of retaining the general wording, which would be explained more fully in later summaries.

— *Summary No. 8 (new No. 7) is adopted without alteration.*

*Chapter B : Examination of the characteristics of the facilities necessitated by traffic considerations.*

*Summary No. 9 (new No. 8) :*

9. With the solution « quadrupling », the necessity of diverting trains from one track to the other used in the same direction being a less frequent event, cross-overs will, in general, be provided only at stations. In the specific case of a section of line with four tracks, where mixed working according to circumstances over the two tracks in the same direction has to be provided for, it will be useful to locate these tracks next to each other and to install some additional crossovers between stations.

— *Summary No. 9 (new No. 8) is adopted without comment.*

*Summary No. 10 (new No. 9) :*

10. With the solution « three tracks », it is generally the view that the centre track should be the one equipped for common user



as this reduces to a minimum conflicting movements. The third track placed « outside » may be preferable in specific situations, when the slow trains are on one and the same side of the line in order that they can run alongside the station facilities at intermediate points and to facilitate shunting of the trains. In such a case it should be possible in principle to run this traffic on the third track alone, or with the use of the adjacent track for one direction only.

— *Summary No. 10 (new No. 9) is adopted without comment.*

*Summary No. 11 (new No. 10) :*

11. On a line with three tracks, in so far as the diversion of trains between the one-way tracks and the track in common user (« voie banalisée ») is concerned, it is necessary to divide the track into independent sections in such a way as to allow of operation by sectional two-way working (« banalisation partielle »); it is desirable for this purpose to install between the one-way tracks and the track in common user, connections with a small angle of turn-out so as to avoid the need for unduly severe reductions in speed by the trains passing through them and to allow these trains, if possible, to run through them at the maximum speed permitted on the less favourable of the two tracks concerned.

Sidings have to be installed where it is necessary to consider holding trains near the crossings and at convenient locations.

At junctions where a direct connection to the track in common user would give rise to fouling movements, it will be usual to have recourse to a fly-over or burrowing junction.

— *Summary No. 11 (new No. 10) is adopted without comment.*

*Summary No. 12 (new No. 11) :*

12. As the cross-overs on the track in common user constitute converging junctions, their frequent use requires, in the interest of safety, that there should be absolute confidence in the rigid obedience to signals; this is why, on lines with a track in common user, it is necessary to attach the utmost importance to the provision of a system of

signalling giving full and clear indication to the drivers, and to the development of other apparatus capable of ensuring absolute obedience to signals, such as cab signals or automatic train control.

Mr. R. LÉVI (*French National Railways*) wondered whether it was advisable to give as an argument in favour of absolute obedience to the signals the frequency with which trains cross over from one track to another.

Others are of the opinion that when a danger reoccurs repeatedly the drivers are particularly careful and consequently respect the signals more easily. Experience shows in fact that most accidents occur not at dangerous points that are frequently used, but at points where there is rarely any danger.

If there are no other arguments in support of special safety measures, it would be better to suppress the text of summary 12 altogether.

If on the other hand, there are some arguments — such as for example the facilities offered, when the traffic increases, by special devices (small angle of turn-out, long laybys, etc.) — then the text of this Summary should be revised, but from quite a different point of view.

Lt.-Col. WILSON agreed with Mr. R. R. LÉVI completely. He was not concerned with knowing what attention had been given to carrying out such and such a signalling installation, but rather with the fact that safety on the railway depends at all times and in all places upon absolute obedience to the signals. All railwaymen are agreed that it is necessary to have signals which give complete and unmistakable indications to the drivers.

The text of Summary 12 should be revised, saying for example that safety on the third track with two-way working cannot be reduced because it is necessary to obtain the maximum output by means of up-to-date signalling which includes in particular interlocking and track circuits.

Perhaps, it would also be as well to point out that certain Railways are in favour of the buffer-section, whilst recognising that experience has proved that those who think that in certain cases it is unnecessary are right.

Mr. TENTI answering Mr. R. LÉVI's remarks, stated that the universally held dogma of absolute obedience to the signals had not prevented the Railways from introducing operating regulations to cover the eventuality of this dogma not being respected. Certain Railways have introduced such supplementary devices as safety points and buffer-sections, but the modern tendency is to reduce or suppress these.

In view of the title of the question under study, the effects of two-way working on safety should be defined. Lt.-Col. WILSON mentioned interlocking and control by means of track circuits : but these are arrangements which are not specifically for use with a third track with two-way working. In fact, the introduction of such working has the sole consequence of increasing the number of cases in which routes cut across each other. This justifies recommending the use of devices used in similar circumstances to increase the guarantee that the signals will be respected; this was the point of the proposed text.

Mr. R. LÉVI thought that the risks inherent in a third track with two-way working

are of two kinds. There are first of all the entries and exits; the risks are exactly the same whether it is question of a third or fourth track or a layby siding; if special devices are to be required in the case of the third track, logically they should also be required in other similar cases.

The second risk is that of meeting a train running in the opposite direction on the track with two-way working : this is exactly the same risk as on a single track line; any safety device laid down for a third track should therefore also be required in the case of a single track line.

It would be sufficient to say that a third track with two-way working should be equipped in the same way as a single track line.

The PRESIDENT thought he ought to intervene in the discussions as he considered Summary No. 12 one of the most important. However it was the principle that should be retained without going into details. It must be recognised that the measures taken to safeguard safety vary appreciably from one Railway to another; for example certain Administrations have stricter requirements regarding the repetition of the signals on the locomotives. The PRESIDENT thought that Lt.-Col. WILSON's suggestion was of great interest. It contains the completely general idea of guaranteeing the same standard of safety on a third track with two-way working as elsewhere on the system, each Railway being free to obtain this result according to its own ways. If the principle is retained without going into details, it will probably be possible to find a text that will be acceptable to everyone.



Sir John ELLIOT (*London-Transport Executive*) supported the PRESIDENT's suggestion.

The PRESIDENT asked Mr. BRETNALL (*Secretary of Section*) to read the revised text based on Lt.-Col. WILSON's suggestion.

Mr. BRETNALL : : Safety should not be reduced by the common user of a third track provided that full advantage is taken of modern signalling technique, including interlocking and track circuit controls. Some countries consider it necessary to provide overlaps between the signals in which full regard is paid to opposing movements at the approach to crossovers. »

Mr. TENTI did not quite agree with Mr. R. LÉVI when the latter stated that the position was identical with that of single track lines. The latter often have an operating programme drawn up for them and there is no hesitation in making one train wait while another passes. A third track with two-way working on the other hand is only considered in the case of a line with heavy traffic, where it may be much more difficult to make any train wait; nor is the safety problem quite the same. If it is generally necessary to repeat the signals on the locomotives, this is even more necessary in the case of a third track with two-way working. The text proposed by Lt.-Col. WILSON is attractive, but mention should be made of repeating the signals on the locomotives and the increase in the number of crossings stressed. Lt.-Col. WILSON agreed with Mr. TENTI when he declared that systems in which

the signals are repeated on the locomotive increase safety of working on a third track, but on the other hand, carrying the same principle further, Col. WILSON stated that with modern methods of operating railways, such systems are equally valuable for preventing collisions when trains cross each other, or trains overtaking each other, or similar accidents. In his opinion, it was somewhat annoying to restrict the application of the summary to the particular form of working in question.

Mr. TENTI suggested modifying the text as follows :

« On lines with a third track with two-way working, the greatest importance must be attached to installing a complete and clear signalling system and to the development of other equipment for assuring absolute obedience to the signals, such as repeating the signals on the locomotive or automatic braking of the locomotives. »

Mr. LÉVI said he would be satisfied if the expression « utilisation fréquente » was left out on the one hand as it did not seem to him characteristic of the risks, and on the other hand the need for absolute obedience to the signals, which is a dogma.

Mr. CREM suggested the following new text :

« As the cross-overs on the track in common user constitute converging routes, it is necessary for the greatest importance to be attached on lines with two-way working to providing a complete and clear signalling system for the drivers and the

development of other equipment intended to assure absolute obedience to the signals, such as cab signals or automatic braking of the locomotives. »

Mr. DEVILLERS (*Belgian National Railways*) wished the question of the safety to be put as follows :

« The traffic fluidity implied by operating a third track from which the greatest possible output is to be obtained justifies an increase in the safety devices compared to standard practice in the usual cases of cross-overs. »

Mr. TENTI suggested that a sub-committee should be formed to prepare the new text.

— *This suggestion was agreed to.*

*Summary No. 13 (new No. 12) :*

13. Since it is particularly necessary, in operating with three tracks, to avoid all unnecessary loss of time — whether it be in the selection of the track to be used, in the determination of the crossing places, or in the general regulating of the traffic — automatic block signalling and centralised traffic control (C.T.C.), capable of effecting at the maximum speed remote indication and control, are to be recommended.

Mr. WALTER considered this a good opportunity to mention certain improvements in centralised traffic control, such as route buttons and storing of routes. If these were not used on the *Houilles-Sartrouville* section, where a third track was built 23 years ago, it was simply because they did not then exist; at the present time, there is no hesitation in adopting them, as was done on the recent introduction of two-way working on the

Blaisy-Dijon double track line. Mr. WALTER suggested that the summary should be completed as follows :

« Centralised control has the maximum advantages for the operating when the dispatcher directly controls the routes themselves and when it is possible to store them. »

— *The summary completed in this way was adopted.*

*Summary No. 14 (new No. 13) :*

14. The regulating is again improved by making available to the dispatcher the most complete and up-to-date apparatus, such as automatic train describers (or automatic graph recorders), radio communication with the drivers of trains.

Lt.-Col. WILSON thought the reference to radio-communications was very debatable. He recalled the serious collision which took place in the United States three or four years ago on a single track line, where the crossing point of two trains normally controlled by the dispatcher was inadvertently altered by a traffic inspector in direct radio communication with the train staff.

Mr. TENTI said he had never intended to suggest that radio might play a part in safety; it is simply another factor for regularity. Lt.-Col. WILSON agreed, but he wished the text could be worded in such a way that it could not be misunderstood, as he had misunderstood it. The allusion to radio communication might be deleted for example.

Mr. CREM thought that as the text referred to regulation and not to safety, radio



should be mentioned as this is one method of regulation, and there was no danger in adopting Mr. TENTI's wording.

Mr. TENTI stated that the replies to the questionnaire mentioned very few practical cases of the use of radio. The point raised is not therefore essential.

Lt.-Col. WILSON recalled that in signalling practice, there are signals which indicate to the driver when he is to pass or to stop, and the instructions to be given to the signal box staff as regards working the signals. It might happen that the instructions given by radio were not understood and lack of comprehension might lead to the signals not being obeyed. However, if the Meeting was satisfied, Col. WILSON would not insist upon this point.

Mr. WALTER asked whether there would not be unanimous agreement if the words : « The regulating is again improved » were replaced by « The task of the dispatcher can be facilitated » which would make it still clearer that it was a question of regulating and not of safety. Mr. TENTI suggested improving still further upon Mr. WALTER's suggestion and satisfying Col. WILSON by making a clear distinction between on the one hand devices for automatic train identification, automatic train running recorders, etc.; which are in common use, and on the other hand, radio which at the present time is still rather a thing of the future. The summary would therefore read as follows :

« 14 (new No. 13). The regulating is again improved by making available to the dispatcher the most complete and up-

to-date apparatus, such as automatic train describers (or automatic graph recorders). The use of radio communication with the drivers of trains may facilitate still further the task of the dispatcher. »

— *This new wording was adopted.*

*Summary No. 15 (new No. 14) :*

15. In general, quadrupling can be planned without C. T. C. as less frequent intervention is then necessary for train regulating purposes.

— *This summary was adopted without comment.*

— The meeting adjourned at 5.30 p.m.

### Meeting of the 5th June 1956.

*President : Mr. David BLEE.*

The PRESIDENT opened the meeting at 9 a.m. and asked that the new text prepared by the sub-committee for Summary No. 12 (new No. 11) should be read.

*Summary No. 12 (new No. 11) :*

« 12. As the cross-overs on the track in common use constitute converging junctions, it follows, as in all similar cases, that both-way (banalised) tracks should be provided with a complete and clear signalling system, and that the locomotives using these tracks should be equipped with suitable devices such as cab-signals or automatic train-control to ensure absolute obedience of signals. »

— *This text was adopted.*

The Meeting then considered Chapter C : *Economic considerations.*

*Summary No. 16 (new No. 15) :*

16. Three tracks, above all when there is a two-way track in the centre, can render necessary consequential major alterations in the lay-out of the existing tracks and signalling. These alterations, in that they are carried out on a line already conveying heavy traffic, may result in an increase in the cost of the scheme.

On the other hand, quadrupling, or a third track laid outside, can be planned and constructed, in certain cases, with a minimum of alterations and of difficulties on the double-track line already in service.

— *This text was adopted.*

*Summary No. 17 (new No. 16) :*

17. The ratios between the costs for the installation of a third track and for quadrupling naturally vary according to local conditions. In the determination of these costs and their ratios, it is necessary in the first place to take into consideration, on the one hand, local geographical conditions, which according to circumstances will make the quadrupling easy or difficult, and, on the other hand, the lay-outs more or less complex as the case may be, at the stations to be adapted. The ratio between these costs for the two solutions, in the cases investigated, varied from 0.6 to 0.85, but it could, in exceptional situations, take values outside these limits.

— *This text was adopted.*

*Summary No. 18 (new No. 17) :*

18. The economic interest, for the existing traffic, of the tripling and the quadrupling of a loaded double track line results from the reduction in the slowing down of trains and in the detention of trains at signals. A further important economic factor is that of the possibility, in some cases, of diverting to the line considered trains which formerly had to be run on lines with, from the technical point of view, less favourable characteristics.

The PRESIDENT thought that this text simply mentioned obvious facts and could be suppressed without inconvenience.

Mr. TENTI agreed, on condition that the following summary was also suppressed, as it formed a continuation to it.

*Summary No. 19 (new No. 18) :*

19. For the comparison between the provision of a third track and quadrupling, it is also necessary to take into account time losses on the third track in common use arising from possible opposing crossing movements.

The PRESIDENT was of the opinion that the summaries as a whole would be strengthened rather than weakened if Nos 18 and 19 were suppressed.

— *The Meeting agreed to this suppression.*

*Summary No. 20 (new No. 17) :*

20. In practice, the inter-dependence of the many factors which are involved in the efficiency and regularity of the service makes it very difficult to give a precise estimate in advance of the results to be expected from one or the other of the two solutions under examination. One method, for example, lies in establishing graphically for each of the two solutions theoretical timetables based on traffic requirements and on the operating possibilities offered by the lay-out, and then to compare the results obtained, taking into account as far as possible the ability of each to deal with out-of-course working conditions.

From this comparison, theoretical data can be ascertained in respect of the number of train-hours, and from these calculated, with due allowance for effective utilisation, the expenditure in terms of vehicle-days, the use of motive power, train crews, etc.

— *This text was adopted.*

*Summary No. 21 (new No. 18) :*

21. The economies in staff at stations and in signalling are above all related to the adoption of centralised signal boxes at stations, of automatic block signalling and of



centralised traffic control, with remote control of points and signals. With this last mentioned installation, which in certain cases allows of the achievement of very substantial economies in staff at stations and on signalling duties, it is, however, necessary to take into consideration the possible need to retain at various points staff who can take the requisite action when incidents of all kinds occur.

In general, the estimates in respect of expenditure on staff at stations and for signalling duties can be established in advance for the different solutions examined, with a considerable degree of approximation.

Mr. WALTER reported that in its official documents the S.N.C.F. had given up using the abbreviation C.T.C., of anglo-saxon origin, and replaced this by the French abbreviation C.C.C. (commande centralisée de la circulation). He asked the Meeting if it would not agree to do the same. In Summaries Nos. 13 (new No. 12) and 15 (new No. 14) C.T.C. would be replaced by C.C.C. in the French text, as well as in Summary No. 21 (new No. 18).

— *This suggestion was adopted, as well as Summary No. 21 (new No. 18) modified in this way for the French text.*

#### *Summary No. 22 (new No. 19) :*

22. In regard to maintenance expenditure on way and works, it is equally possible to establish in advance estimates sufficiently accurate for the two solutions — the provision of a third track and quadrupling. It will also be necessary to take into account the expected requirements in staff and equipment in the light of the nature and arrangements of the installations, and according to the annual user of each track, expressed, for example, in :

total ton-kilometres		train-kilometres
_____	and	_____
kilometre		kilometre

— *This text was adopted.*

#### *Summary No. 23 (new No. 20) :*

23. On the basis of operating expenses determined as above and of capital charges (interest and depreciation) it is possible to proceed to calculate the total annual expenses for each of the two solutions contemplated, and finally to estimate in approximate terms the expenses per unit of movement and per unit of traffic.

— *This text was adopted.*

The Section then considered Chapter D : *Limits to the application of a third track in common user (triplement avec banalisation).*

#### *Summary No. 24 (new No. 21) :*

24. The solution « three tracks », which, in principle, is less costly than quadrupling, can only be considered if the traffic peaks present certain clearly defined characteristics.

Even if traffic conditions are in favour to « tripling », the quadrupling renders more easy the making of, and adherence to time-tables and ensures a greater capacity, advantages which may lead to it being given preference from the operating point of view, the more so if account is taken of future needs.

Mr. TENTI stated that there was a slight difference in meaning which had eluded him when he prepared this text, and he suggested replacing « advantages which may lead » by « advantages which would be likely to lead ».

— *The text amended in this way was adopted.*

#### *Summary No. 25 (new No. 22) :*

25. On lines carrying a very heavy traffic the « third track in common user » may be preferred, in the case where the characteristics of the traffic being suitable to the quadrupling if the cost of the latter is much higher which is normally the case above all owing to the particular configuration of the ground. The most characteristic examples are the following :

a) sections common, near to large town,

with traffic peaks of different speeds but only in one direction at a time, with high cost of land or major civil engineering works necessary with quadrupling : a typical case of sections of line common to suburban and main line traffic with peaks in one direction only in the morning, at midday and in the evening;

b) short sections interposed between four-track sections, such as for the passage of major engineering works too expensive to quadruple.

The PRESIDENT wondered if the English text of the first paragraph was not rather too literal a translation of the French. He suggested replacing « in the case where the characteristics of the traffic being suitable to quadrupling, if the cost of the latter is much higher, which is normally the case above all owing to the particular configuration of the ground » by « where the cost of quadrupling is much higher as is normally the case, particularly where the configuration of the ground is a factor. »

— *This suggestion was adopted.*

Mr. CREM suggested, in order to lighten the text, suppressing the following part of the sentence which is a mere repetition : « with traffic peaks of different speeds but only in one direction at a time. »

— *This suggestion was adopted.*

M. JOHNSON suggested replacing in paragraph b) of the English text « such as for the passage » by « because of the incidence ». (*Approved.*)

Mr. PINSON (*Secretary of Section*) pointed out that this alteration in the English text meant changing the French text, which should read as follows : « ...courts tronçons encadrés par des sections de ligne à quatre voies, par l'inci-

dence d'ouvrages importants dont le quadruplement serait trop onéreux. » The meaning of the sentence is therefore slightly altered.

Mr. CREM suggested adopting in the case of the French text the following wording : « ...courts tronçons encadrés par des sections de ligne à quatre voies, comportant des ouvrages d'art importants dont le quadruplement... »

— *As this suggestion was adopted, the final text of Summary No. 25 (new No. 22) was approved in the following form :*

« 22. On lines carrying a very heavy traffic the « third track in common user » may be preferred where the cost of quadrupling is much higher as is normally the case, particularly where the configuration of the ground is a factor. The most characteristic examples are the following :

« a) common sections, near to large towns, with high cost of land or major civil engineering works necessary with quadrupling; a case typical of sections of line common to suburban and main line traffic with peaks in one direction only in the morning, at midday and in the evening.

« b) short sections interposed between four track sections, because of the incidence of major engineering obstacles too expensive to quadruple. »

*Summary No. 26 (new No. 23) :*

26. In addition to the cases cited, the provision of a third track, with or without common user (according to circumstances) may be sufficient for traffic requirements on sections of line carrying a very mixed traffic (substantial variations in train speeds) where it is specially important to allow the overtaking without stopping of the trains.



Mr. MOULART wondered if this text did not repeat in different words part of Summary No. 4, and should be suppressed?

Mr. TENTI prepared this text solely in consideration of the American point of view. In the United States, we find three tracks for much lower traffic levels than in Europe. The only plausible explanation for such a practice seems to be the great differences in speed between the different trains. Summary 26 deals with this case unlike the previous Summaries, dealing with lines carrying a very heavy traffic.

Mr. R. LÉVI suggested leaving out « hétérogène » which might give rise to confusion because there might be heterogeneity not only between trains running in the same direction but also between the two directions of running, the latter not being referred to in fact. For this reason, that part of the sentence : « a very mixed traffic (substantial variations in train speeds) » by « traffic having substantial differences in speed, sections where... »

— *This suggestion was approved, and the Summary modified in this way was adopted as follows :*

« 23. In addition to the cases cited, the provision of a third track, with or without common user (according to circumstances) may be sufficient for traffic requirements on sections of line carrying traffic having substantial differences in speed, sections where it is specially important to allow overtaking without stopping the trains. »

#### *Summary No. 27 (new No. 24) :*

27. The fact that many Railways only had for a long time an insufficient experience of the potentialities offered by centralised traffic control, both from the traffic and technical points of view, can have led more easily in the past, to neglect the solution « third track in common user ». At present, in the light of technical progress, the risk of a C.T.C. installation being put out of service accidentally is slight, and this cannot constitute a factor sufficient to reject this solution.

— *This summary was adopted, the abbreviation C.T.C. being replaced by C.C.C. in the French text.*

#### *Summary No. 28 (new No. 25) :*

28. In the future, the provision of a third track in common user will, it seems, be adopted more frequently than in the past even if its scope for application to lines with very heavy traffic remains limited in general to relatively short sections with special characteristics.

— *This text was adopted without modification.*

The PRESIDENT stated that the Assembly had thus completed the task allotted to it. He did not wish to end the Meeting without thanking the Reporters and Special Reporters on his own behalf and on behalf of the whole Assembly. He had derived great pleasure from presiding over the discussions, in such a pleasant atmosphere of courtesy and good humour. He expressed his thanks to those colleagues, who had competently translated the comments made, and last but far from least the ladies who had taken records of the discussions.

— *The Meeting ended at 10.50 a.m.*

N. B. — *The final and complete text of the Summaries adopted for Question 1 is given hereafter, page 861 to 866.*

## SECTION II. — Locomotives and rolling stock.

[ 621 .431 .72 ]

### QUESTION 2.

In a system of standard, narrow or broad gauge lines which has Diesel traction for shunting and for main line working, what are the conditions governing :

- 1) the choice of the characteristics and kind of transmission ;
- 2) the most economical organisation, maintenance and operation.

Research into savings that might be possible in comparison with steam traction.

#### Preliminary documents.

Report (*America [North and South], Australia [Commonwealth of], Burma, Ceylon, Egypt, India, Irak, Iran, Republic of Ireland, Japan, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, United Kingdom of Great Britain and Northern Ireland and dependent overseas territories*), by R. F. HARVEY. (See *Bulletin* for February 1956, p. 129.)

Report (*Austria, Belgium and Colony, Bulgaria, Czechoslovakia, Denmark, Ethio-*

*pia, Finland, France and French Union, Germany [Federal Republic], Greece, Hungary, Indonesia, Italy, Luxemburg, Netherlands, Norway, Poland, Portugal and overseas territories, Rumania, Spain, Sweden, Switzerland, Syria, Turkey, Viet-Nam and Yugoslavia*), by R. BIAIS. (See *Bulletin* for March 1956, p. 233.)

Special Report, by R. F. HARVEY. (See *Bulletin* for May 1956, p. 427.)

## SECTIONAL DISCUSSION.

Meeting of the 4th June 1956 (afternoon).

Mr. A. PORCHEZ, *Directeur Général Adjoint de la Société Nationale des Chemins de fer Français, Member of the Permanent Commission of the Association, in the Chair.*

— The meeting began at 3.15 p.m.

as *Vice-Presidents* :

The PRESIDENT welcomed the delegates and declared that the Permanent Commission proposed the constitution of the Bureau of the Section as follows :

Dr. F. SCHELP, *Präsident der Deutschen Bundesbahn, member of the Permanent Commission of the Association, and*

Dr.-Ing. A. CUTTICA, *Vice-Directeur*



Général des Chemins de fer de l'Etat Italien; member of the Permanent Commission of the Association;

as *Principal Secretary* :

M. R. SQUILBIN, Ingénieur Principal à la Société Nationale des Chemins de fer Belges. Technical Secretary of the International Railway Congress Association;

as *Secretaries* :

M. G. OBERREINER, Inspecteur du Service du Matériel et de la Traction, Région Sud-Est, Société Nationale des Chemins de fer Français, and

Mr. A. E. BERESFORD, Engineer, British Railways.

— *The Meeting signified its approval.*

The PRESIDENT, after expressing his thanks to the Meeting, suggested that each of the Summaries of Mr. HARVEY's Special Report be discussed in turn.

He asked Mr. HARVEY (*Special Reporter*) to read these summaries.

*Summary 1 :*

1. The formula according to which the whole power is concentrated in a single locomotive is that which produces the lowest capital and maintenance costs. However, dividing up the power required between two locomotives conduces to more flexible working. Moreover, it is necessary to do so at the present time whenever the power required exceeds 2 000 HP.

Multiple unit locomotives, which can only be run as multiple units, are now in use in the U.S.A.

Mr. BULLEID (*Coras Iompair Eireann*) pointed out that the figure of 2 000 HP is rather low since there are in existence more powerful single locomotives; he suggested 2 500 or even 3 000 HP.

Mr. DA COSTA (*Railway Board of India*) suggested altering the English text by putting « desirable » instead of « necessary »; he stated that there are in fact 2 200 and 3 200 HP single locomotives in India.

The PRESIDENT agreed with Messrs BULLEID and DA COSTA; he thought however that the figure of 3 000 HP; which appears to be rather exceptional, should not be used, but merely 2 500 HP.

— *The text of Summary 1 is adopted with these two modifications, as follows :*

« 1. The formula according to which the whole power is concentrated in a single locomotive is that which produces the lowest capital and maintenance costs. However, dividing up the power required between two locomotives conduces to more flexible working. Moreover, it is desirable to do so at the present time whenever the power required exceeds 2 500 HP.

« Multiple unit locomotives, which can only be run as multiple units, are now in use in the U.S.A. »

*Summary 2 :*

2. It is obviously advantageous to reduce the number of classes of locomotives. It is also advantageous to provide standard equipment, common to several classes, at least in the case of the auxiliary equipment.

— *As no comments were made, Summary 2 was adopted.*

### Summary 3 :

3. Under commercial transport conditions as found in Europe, it is difficult for any single type of locomotive to be suitable for hauling all the different categories of trains. It appears necessary to provide one type of locomotive intended for fast or heavy traffic on the main lines (1 500 to 2 000 HP or over), and one or several types of locomotives for mixed traffic on the main and secondary lines (750 to 1 500 HP) and for the traffic on the secondary lines as well as for shunting if necessary (less than 750 HP).

Mr. DA COSTA wondered if the powers mentioned in Summary 3 were not in contradiction with Summary 1 : the same 1 800 HP locomotive might, for example, be used as a single unit on the secondary lines and as a double unit on the main lines.

The PRESIDENT pointed out that the object of Summary 3 was, above all, to point out that the same type of locomotive cannot be used for the different traffics to be worked; the powers given are merely an indication.

Mr. HARVEY (*Special Reporter*) agreed with the PRESIDENT. He suggested however that the figure of 2 000 HP should be increased to 2 500 HP as in Summary 1.

Mr. CUTTICA, *Vice-President (Italian State Railways)* considered that the word « type » usually indicating the constructional arrangement of the locomotive might lead to confusion in this case, as locomotives with the same axle arrangement could work passenger services as well as freight services. As in this case the distinction referred rather to the powers currently used, he thought some other term should be used.

Agreeing to this request, the PRESIDENT suggested that a revised text should be submitted at the next meeting. (*Agreed.*)

### Summary 4 :

4. In the case of shunting, for the different kinds of services, there are three corresponding classes of locomotive, the powers of which are :

— for shunting in the small stations and shops : less than 200 HP;

— hump shunting and branch line services : 350 to 600 HP;

— heavy shunting and transferring rakes : 600 to 800 HP.

In some countries, these powers may be exceeded. They largely are in the U.S.A. where they may be as much as 1 000 to 1 600 HP.

— *As no comments were made, Summary 4 was adopted.*

### Summary 5 :

5. The axle arrangement depends upon the permissible axle loads. In the case of the line locomotives, the type A1A-A1A is that most used on light track. The BB and CC types are widely used on standard gauge lines.

Some of the railways on the Continent consider that the BB type is the most economical up to 1 700 HP as far as wear of the track and tyres is concerned, whereas others prefer the CC and even the 1C-C1 type.

However, up to the present, insufficient data is available to determine which axle arrangement gives the greatest saving as regards permanent way maintenance.

In the case of locomotives of average power running at less than 60 km (37 miles)/h, parallel axles from the type B to the type D can be used. In other cases, bogies are preferable.

Mr. CUTTICA considered that the first phrase did not stress sufficiently the



influence of the type of track, rail and bed, on which the rolling stock runs. He also drew attention to the different stresses exerted upon the track by locomotives with two or three axled bogies.

After an exchange of opinions in which Mr. MUSQUAR (*Luxemburg Railways*) and Mr. BIAIS (*Reporter*) took part, the PRESIDENT suggested replacing the expression « permissible axle loads » by « axle loads allowed by the track ».

Mr. CUTTICA agreed with this.

Mr. BULLEID for his part pointed out that there was an error in the English text; in the last line of the Summary « bogies are preferable » should be replaced by « bogie locomotives are preferable ».

— *Summary 5 was adopted with these two modifications.*

#### *Summary 6 :*

6. Diesel engine technique can now provide reliable and powerful engines, and the tendency is to give up the use of two-engined locomotives.

When specially trained labour is available, or can be trained to make sure the maintenance work is properly carried out, it is not considered advisable to sacrifice the efficiency of the Diesel engine.

On some Railways, where the recruiting of trained labour for maintenance and the supply of spare parts present a serious problem, it may however be desirable to look into the advisability of using a simple lower efficiency Diesel engine of a well tried type.

Mr. CUTTICA and Mr. BULLEID considered that in the present state of the question, it could not be affirmed that there was a

tendency to give up using two engined locomotives. The most that could be said was that perhaps there was a tendency to prefer locomotives with one engine.

Dr.-Eng. GAEBLER (*Deutsche Bundesbahn*) pointed out that the Deutsche Bundesbahn is using both techniques : because of standardisation, it has used two 1 000 HP engines, already in use, on its present locomotives, but on the other hand, it is fitting its new locomotives for mixed services with a single 1 600 to 1 800 HP engine. He also stated that in the case of the B.B. locomotive with hydraulic transmission, the arrangement with two engines each driving a bogie is preferable.

Mr. CUTTICA thought it would be as well to mention this opinion, but with certain reserves, as it is not shared by all the railways.

To meet the comments made, Mr. SQUILBIN suggested replacing the first paragraph of the Summary by the following text :

« 6. Diesel engine technique can now provide reliable and powerful engines, and the tendency is to prefer single-engined locomotives. However, for special reasons (standardisation, type of transmission) two-engined locomotives may be preferred. »

— *This suggestion was adopted.*

*As no further comments were made, the two last paragraphs of Summary 6 were also adopted, the text of this Summary being as follows :*

« 6. Diesel engine technique can now provide reliable and powerful engines, and the tendency is to prefer single-engined locomotives. However, for special reasons (standardisation, type of transmission) two-engined locomotives may be preferred.

« When specially trained labour is available, or can be trained to make sure the maintenance work is properly carried out, it is not considered advisable to sacrifice the efficiency of the Diesel engine.

« On some Railways, where the recruiting of trained labour for maintenance and the supply of spare parts present a serious problem, it may however be desirable to look into the advisability of using a simple lower efficiency Diesel engine of a well tried type. »

#### *Summary 7 :*

7. Several Administrations have put into service Diesel locomotives fitted with two-stroke engines. It is however not yet possible to make any statement on the final balance sheet of the respective advantages and drawbacks of two and four-stroke engines.

Mr. BOULANGER (*Belgian National Railways*) thought that the wording of this Summary might be misinterpreted and give the impression that the two stroke engine has not yet been sufficiently tried out. He pointed out that in the U.S.A. this type of engine is far and away the most widely used.

Mr. HARVEY agreed with Mr. BOULANGER and expected to find arguments in favour of the two-stroke engine in the

replies received from the American Railways. However, they did not express any positive opinion on this subject.

Mr. UPMARK (*Swedish State Railways*) thought that at the present time no one was in a position to decide the question of four-stroke or two-stroke, and therefore did not think the text of the Summary ought to be modified.

The PRESIDENT suggested, however, that to make the question clear, the Summary should be preceded by a brief commentary giving the present position in the U.S.A. and Europe. He said that a new text would be put before the section at the next meeting. (*Agreed.*)

#### *Summary 8 :*

8. Having a driving compartment at each end appears advisable in the case of locomotives used for train services. On shunting locomotives, on the contrary, the solution of a single driving compartment is preferred. Certain Railways state that this should be in the centre of the locomotive and others at one end.

Mr. BOULANGER considered that in the case of powerful line locomotives used for fast services, it was essential to have a driving compartment at each end.

Mr. DA COSTA on the other hand considered that the word « advisable » was rather excessive; a single driving compartment at one end, as in America, made it easy to pass from one locomotive to the other when two locomotives were coupled up. The only drawback to this arrangement is the necessity to turn the locomotive at the end of the run.



The PRESIDENT pointed out that the electric locomotives in service on the Valenciennes-Thionville line for example only have a single driving compartment in the centre.

Mr. BOULANGER called attention to the question of visibility which, in his opinion, is of primordial importance and recalled that at the O.R.E. meeting all the Administrations were agreed that manufacturers should be required to make locomotives with a driving compartment at each end.

Mr. BIAIS pointed out that, in his opinion, the simplification of construction and consequently lower cost of the locomotive should also be taken into account.

Mr. BULLEID stated that he was completely satisfied with the wording of the summary. In his opinion, the possibility of driving the locomotive with only one man must also be taken into account as this makes possible a great reduction in operating costs; this condition implies the provision of a driving compartment at each end.

The PRESIDENT considered that the various objections put forward made it necessary to revise the wording of the Summary; a new text would be prepared and discussed at the next meeting.  
(Agreed.)

#### Summary 9 :

9. The present fields of application of mechanical and electrical drives are fairly well defined : engines of less than 200 HP and more than 800 HP respectively. Between these two powers, the hydraulic drive competes with the other two types. Compared with electrical drive, hydraulic drive

is cheaper to buy and about the same as regards convenience of driving, regularity of working and efficiency. When the engine has to drive more than two axles the electrical drive undoubtedly gives more elegant solutions.

Mr. WESSELS BOER (*Netherlands Railways*) considered that this Summary was too categorical and that there is not yet sufficient experience to determine the technical merits of the different types of transmission on comparable locomotives.

From the point of view of power, Mr. GAEBLER stated that the Deutsche Bundesbahn has in service 600 to 1 000 HP hydraulic transmission; that it is now carrying out trials with a 1 200 HP transmission and that it is building 1 600 to 1 800 HP transmissions. When it is question of driving more than two axles, it must be pointed out that the Deutsche Bundesbahn has locomotives with four motor axles with hydraulic transmission and a new type of locomotive, with two bogies and a single engine will have a single transmission of 1 600 HP driving the four axles.

Mr. CUTTICA thought it desirable to mention in the Summary this very important German experience.

Mr. BIAIS pointed out that if it is not mentioned in the Summary, it is dealt with in his report.

Mr. BULLEID asked Mr. CUTTICA if mention should not be made of the mechanical transmissions of more than 200 HP in use on the Italian Railways?

Mr. CUTTICA stated that in fact trials were in hand with mechanical transmissions of great power, up to 1 500 HP,

but it seemed premature to discuss these now.

MESSRS MUSQUAR and BOULANGER, like Mr. GAEBLER, did not agree with the last sentence of the Summary; in fact there are a great many shunting locomotives with three or even four axles with hydraulic transmission, and this solution with coupled rods is just as elegant as the electrical solution.

To take into account the new information now supplied, the PRESIDENT suggested that the text of the Summary should be revised and divided into two parts, one dealing with the remarks made, as a result of the information supplied to the Reporters, and the other the present tendencies on certain Administrations. This new text could be discussed at the next meeting. (*Agreed.*)

#### *Summary 10 :*

10. Fitting a « dead man's device » is to be recommended on line locomotives driven by one man. It may also be of value when the locomotive has a crew of two men.

Certain Administrations do not consider it necessary to fit this device on shunting locomotives.

Dipl.-Eng. FLEMMING (*Deutsche Bundesbahn*) stated that the D.B. was also equipping its shunting locomotives driven by one man with a dead man's device.

The PRESIDENT, supported by Mr. MUSQUAR, pointed out that this fact is not in contradiction with the text of the Summary; he thought moreover that most Administrations tend not to fit the dead man's handle device on shunting

locomotives driven by one man unless obliged to do so by law. He suggested completing the second paragraph of the Summary by « even if they are driven by only one person ».

— *The Summary was adopted with this amendment.*

#### *Summary 11 :*

11. The trains are heated either by steam heating or electric heating, according to the kind of equipment in the rolling stock being hauled.

In the case of steam heating — the most widely used — the steam boiler is preferably installed on the locomotive. The heating boiler-van ought only to be used exceptionally owing to the operating difficulties involved.

Mr. BULLEID did not agree with this Summary; he thought in fact that it is better not to fit the boiler on the locomotive seeing that it is heavy, consumes fuel-oil, which might otherwise be used for traction purposes, is only in use part of the year, and may make it necessary to have a second man on the locomotive. The boiler-van, in his opinion, makes it much easier to preheat the trains.

Mr. HARVEY said he agreed with the technical arguments of Mr. BULLEID but pointed out that these must be balanced against the operating drawbacks of using a boiler-van.

Mr. CUTTICA stated that in view of the operating difficulties involved, the Italian Railways will give up as soon as possible the boiler-vans used in certain cases, on account of the shortage of electrically heated coaches, to steam heat trains hauled



by electric locomotives. Some of these last named locomotives are even fitted with a steam boiler. The preheating of the trains presents no difficulty in his opinion, as in most cases, there is an independent steam supply in most stations.

Another solution, but in his opinion a very costly one, is to equip each coach with an automatic heating installation by means of a fuel-oil boiler, as is done in particular on railcar trailers.

Mr. BULLEID replied that the high cost of the other solutions and the special conditions existing in Ireland led to the choice of the boiler-van solution which is considered very elegant.

Mr. BOULANGER stated that the Belgian National Railways put into service in 1955 seventy-five locomotives with boilers on the locomotives and this system has given complete satisfaction, the locomotives being driven by one man.

The PRESIDENT confirmed the opinion expressed by Mr. CUTTICA as far as the S.N.C.F. is concerned.

Mr. BULLEID admitted that in certain cases the boiler-van gives rise to operating difficulties.

Mr. HARVEY suggested modifying the last sentence of the Summary as follows : « Boiler-vans present a difficulty to the operating staff in many cases, such as terminals. »

— *The Summary 11 was adopted with this modification and will be worded as hereafter :*

« 11. The trains are heated either

by steam heating or electric heating, according to the kind of equipment in the rolling stock being hauled.

« In the case of steam heating — the most widely used — the steam boiler is preferably installed on the locomotive. Boiler-vans present a difficulty to the operating staff in many cases such as terminals. »

#### *Summary 12 :*

12. Shunting locomotives can be driven by one man. Usually there is a second man to help the driver on locomotives used for train services.

After a discussion in which Messrs MUSQUAR, CUTTICA, UPMARK, BULLEID, BROUCKAERT (*Belgian National Railways*) and FLEMMING took part, it was decided that whilst maintaining the technical aspect of the question, this Summary should be modified as follows :

« 12. Diesel locomotives can be driven by one man. »

— *Adopted.*

— The meeting adjourned at 5.30 p.m.

#### **Meeting of the 5th June 1956.**

*President :* Mr. A. PORCHEZ.

— The meeting began at 9 a.m.

The PRESIDENT suggested that those Summaries, which it has been decided to revise at yesterday's meeting, should now be examined.

The proposed texts were read out as follows :

*Summary 3 :*

« 3. Under commercial transport conditions as found in *Europe*, it is difficult for any single class of locomotive to be suitable for hauling all the different categories of trains. It appears necessary to provide one class of locomotive intended for fast or heavy mixed traffic on the main lines (1 500 to 2 500 HP or over), and one or several classes of locomotives for mixed traffic on the main and secondary lines (750 to 1 500 HP) and for the traffic on the secondary lines as well as for shunting if necessary (less than 750 HP). »

*Summary 7 :*

« 7. In the U.S.A., the 2-stroke engine is the more widely used; in Europe the 4-stroke engine is more generally used.

« However, several European Administrations have put into service Diesel locomotives fitted with two-stroke engines. They are, however, not yet in a position to make any statement on the final balance sheet of the respective advantages and drawbacks of two and four-stroke engines. »

*Summary 8 :*

« 8. The provision of a single driving compartment permits a reduced cost of construction. However, the requirements of visibility may necessitate the provision of a compartment at each end.

« For this reason on locomotives working train services the arrangement with a compartment at each end appears desirable. On shunting locomotives, however, the single compartment is

preferred. Certain Railways state that this should be in the centre of the locomotive and others at one end. »

— *As no comments were made, Summaries 3, 7 and 8 were adopted.*

*Summary 9 :*

The PRESIDENT stressed that this Summary had been modified and simplified by leaving out certain facts, which as they had been included in the special report, did not seem to be necessary in this Summary.

The new text is given as hereafter :

« 9. From the information received, it appears that in the majority of cases mechanical transmissions are used for relatively low powers; electric transmissions for high powers.

« Hydraulic transmissions compete with the other two types at medium powers. However, some satisfactory arrangements of hydraulic transmission for higher powers have recently been effected. »

— *As no comments were made, Summary 9 was adopted.*

The PRESIDENT then asked Mr. HARVEY to read the following Summaries.

*Summary 13 :*

13. Common user leads to the best use being made of locomotives and staff. It is an advantage for the staff to be trained to drive the different classes of locomotives and railcars.

Mr. CUTTICA pointed out that the main fact to be stressed here was the complete common user of Diesel locomotives.



The PRESIDENT then suggested modifying the text of the first sentence as follows :

« The Diesel locomotive permits common user, and therefore, allows the best use of locomotives and staff. »

The second sentence remains unchanged.

The final text of this summary will be submitted to the assembly at the end of the meeting.

#### Summary 14

14. In the case of several shunting stations, when possible it is advantageous to use the same locomotives for the train services and for shunting operations in the stations involved.

It may be of value to modify the method of operating on certain lines, either to improve the service, or to obtain a better user of the locomotives.

— *This Summary was adopted without modification.*

#### Summary 15 :

15. It is possible to entrust the driving of the small locomotives to the station staff of the stations where they are in use. This staff must then be trained and supervised, and provision made for carrying out small maintenance jobs on the spot.

— *No comments being made, Summary 15 was also adopted.*

#### Summary 16 :

16. In the first stages of dieselisation it is reasonable to count upon 20 % of time out of service and rates of utilisation of more than 12 hours out of twenty-four.

Mr. UPMARK asked what length should be attributed to the « first stage of dieselisation. »

Mr. HARVEY considered it reasonable to count upon one and a half to two years.

Mr. UPMARK also pointed out that the figures quoted hardly agree the results obtained by certain railways; a rate of user of 12 hours out of 24 is much too low in his opinion, as obviously the Administrations tend to make the greatest possible use of their new stock.

Mr. HARVEY pointed out that the figures given are averages based upon the data supplied by the Administrations.

Messrs MUSQUAR and BROUCKAERT agreed with Mr. UPMARK.

The PRESIDENT considered that the text of Summary 16 should be revised to take these comments into account; he suggested the new text should be submitted to the assembly at the end of the meeting. (*Agreed.*)

#### Summary 17 :

17. Owing to the greater availability of the Diesel locomotive, it is possible to work an identical service with an appreciably smaller number of locomotives with Diesel traction than with steam traction. Compared with the stock of steam locomotives, the stock of Diesel locomotives replacing them is generally in the ratio of 0.6 to 0.8

Mr. FLEMMING considered that the figures of 0.6 to 0.8 are only valid in the case of locomotives used on the main lines and not for shunting locomotives nor for locomotives used on secondary lines where often the ratio of replacement amounts to 1, as there are

not sufficient services to profit by the greater availability of Diesel locomotives.

Mr. BOULANGER stated that even in the case of shunting locomotives, it was possible to get a ratio of 0.6 to 0.8; he quoted as an example a large S.N.C.F. centre where 20 Diesel shunting locomotives have replaced 25 steam locomotives.

Mr. BIAIS considered that an increase in the ratio given in the report would be in contradiction with the statements previously made in connection with the value of the rate of user, as this would lead one to think that steam locomotives were used 24 hours out of the 24.

Messrs. UPMARK and FLEMMING were of the opinion that a distinction should be made between the availability of the Diesel locomotive and the possibility of using it : on secondary lines, the availability of the Diesel locomotive, much greater than that of the steam locomotive, could not be effectively used.

Mr. BROUCKAERT supported this opinion and suggested introducing into the Summary a restriction as regards the possibility of using the locomotives.

The PRESIDENT agreed with this suggestion, which was adopted.

— The new text of the Summary will be submitted to the Section at the next meeting.

#### *Summary 18 :*

18. The periods between the different inspections and overhauls can be determined

either by the mileage or the number of days or hours in service. The mileage basis gives a fairly close indication of the condition of the engine and the locomotive. The time basis is more convenient to follow for the maintenance services. An intermediate method is to base the inspections on the number of days or hours in service and the overhauls on the mileage.

#### *Summary 19 :*

19. It is recommended that an analysis of the lubricating oils and a spectographical examination of the ash be made in order to obtain information on the advisability of making an oil change or carrying out preventive repairs on some engine component.

#### *Summary 20 :*

20. As with other methods of traction, maintenance includes on the one hand preventive inspections, and on the other overhauls according to a predetermined programme. Whether this is based on « mileage » or « time », there is a whole scale of inspections corresponding to the amount of work to be done. Between two general overhauls of the locomotive, the engine is given a part overhaul without being dismantled.

In most cases, the overhaul periods laid down when the Diesels were put into service would appear from experience to be capable of being increased. It appears that the most economic maintenance policy is to make high grade repairs at longer intervals.

#### *Summary 21 :*

21. Care must be taken to see that the water used for cooling the engine is neither corrosive nor scale-forming.

#### *Summary 22 :*

22. Provided certain rearrangements are made, it is possible to make use of the steam traction installations. Such rearrangements affect the entry and exit lines (installations of fuel, oil, water and sand supplies) and the sidings in the shed (making inspection pathways, mobile hoods to draw off the



exhaust gases, etc.). In mixed sheds, it is recommended that separate installations be reserved for Diesel traction.

### *Summary 23 :*

23. The stocking and supplying of the fuel-oil requires at least two tanks, one of which is a spare and settling tank. Expressed in days of average consumption, the total capacity of a distribution centre varies between 20 and 40 days; the settling period varies according to the quality of the fuel-oil. There is a tendency to give up centrifuging the fuel and towards perfecting the filtering methods.

— *No comments having been made, Summaries 18 to 23 were adopted.*

### *Summary 24 :*

24. Since the Railway Administrations find themselves obliged to renew a certain proportion of their stock of steam locomotives, it is natural that they should change over to a method of traction which shows operating economies under the following three heading : power, driving costs and shed costs.

a) As regards fuel, the economy depends on the comparative cost of coal and fuel-oil, including taxes. In most cases, especially in the case of shunting, very substantial economies have been recorded.

b) As regards driving staff the economies are considerable when only one man is needed on the locomotive.

Even in other cases, they are substantial, simply on account of the better user of the staff.

c) As regards shed costs, economies of more than 40 % may be obtained.

Mr. LAMIRAL (*French National Railways*) suggested stressing the fact that the savings vary with the kind of service by adding « ...greater or lesser operating economies according to the kind of service... »

Mr. FLEMMING wished to add further

supplementary information to the data previously supplied by the Deutsche Bundesbahn and included in Mr. BIAIS' Report.

As regards fuel economy, an examination of the Table on page 274 (\*) might lead one to think that the Deutsche Bundesbahn has not made any savings; such a conclusion would be erroneous. It was pointed out at the time that an economy of 40 to 50 % on shunting services and rather less for line services could be expected; in addition, present fluctuations in the price of coal and fuel oil have modified this situation in favour of dieselisation. Consequently, a « black spot » should be added in the column « saving of fuel » of this table.

As regards personnel, the situation has also changed since the replies to the questionnaire were sent in. On the one hand the Deutsche Bundesbahn has reorganised the driver's work by having as far as possible the preparation of the locomotive and the duties of the staff on arrival done by local staff; they have also increased the number of Diesel locomotives driven by one man. These two factors have led to substantial personnel economies, and justify the addition of a « black spot » in the column « saving of engine drivers » of the table on page 274 of Mr. BIAIS' Report.

The PRESIDENT thanked Mr. FLEMMING for this additional information. He suggested that the Section should agree the text of Summary 24, taking into account the modification proposed by Mr. LAMIRAL.

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(\*) *Bulletin* for March 1956.

— *Adopted, after alteration of the first paragraph as follows :*

« Since the Railway Administrations find themselves obliged to renew a certain proportion of their stock of steam locomotives, it is natural that they should change over to a method of traction which shows operating economies *which are more or less marked according to the type of service*, under the following three headings : power, driving costs and shed costs. »

*Summary 25 :*

25. Economies under the heading maintenance have been recorded by some Administrations. It is too soon to express a definite opinion on this subject.

*Summary 26 :*

26. Apart from strictly economic consideration, there are others, such as the improvement of passenger transport conditions, the improvement of working conditions for the driving and maintenance staff, and the greater flexibility of working. In African countries, doing away with the perennial problems of water and coal is an appreciable advantage.

*Summary 27 :*

27. At the present time it is difficult to assess the economic repercussions of dieselisation on departments of the railway other than the Locomotive Running Department (Motive Power). In particular, it is not yet possible to say how the permanent way maintenance costs and operating receipts will vary, all other things remaining equal. The considerable reduction in the risk of fires along the tracks can however be mentioned.

— *No comments having been made, Summaries 25, 26 and 27 were adopted.*

*Summary 28 :*

28. In general moreover, the difficulty the Administrations have found in presenting a complete economic balance sheet shows that it is still too early for all the conclusions on the economic aspects of dieselisation to be drawn.

Mr. BONNEFON (*International Railway Union — O.R.E.*) considered that this last Summary ended the discussions on rather a pessimistic note. He suggested adding that the profitability of the change-over appears favourable in more and more cases.

To take this comment into account, the President suggested rewording the Summary as follows :

« In general moreover, the difficulties in which the Administrations have found themselves in preparing economic balance sheets show that though it is too soon for every conclusion as regards the economic aspects of dieselisation to be drawn, the present results are already very favourable and everything leads us to think that they will be even better in the future... »

— *Adopted.*

The PRESIDENT suggested adjourning the meeting to enable the new wording of the remaining texts to be discussed to be prepared. (*Agreed.*)

— The meeting adjourned at 10.30 a.m. and began again at 11.15 a.m.

The new texts of the following Summaries were read.



*Summary 13 :*

« 13. Diesel locomotives are capable of common user. They, therefore, permit the best use of locomotives and staff.

It is an advantage for the staff to be trained to drive the different classes of locomotives and railcars. »

*Summary 16 :*

« 16. From the information supplied by the Administrations, it appears that in a general way, time of service is about 20 %. Some Administrations, however, report lower figures than this. So far as rates of utilisation are concerned, which are essentially dependent upon the services in operation, they frequently reach 60-70 %. »

*Summary 17 :*

« 17. Owing to the greater availability of the Diesel locomotive, it is possible to work an identical service with an appreciably smaller number of locomotives with Diesel traction than with steam traction. Compared with the stock of steam locomotives and so far as operating conditions (traffic density, etc.) allow, the stock of Diesel locomotives replacing them is generally in the ratio of 0.6 to 0.8. »

— *As no comments were made, Summaries 13, 16 and 17 were adopted.*

Returning to *Summary 28*, Mr. BROUCKAERT asked whether it was necessary to say that results would be even more favourable in the future; if it is true that

present results are very favourable, they are not however definitive, since the repair factor is not yet known.

After a short exchange of opinions in which the PRESIDENT, Messrs BIAIS, BOULANGER and BONNEFON took part, the following text was finally proposed :

« In general moreover, the difficulty the Administrations have found in presenting a complete economic balance sheet shows that it is still too early for all the conclusions on the economic aspects of dieselisation to be drawn. In an increasing number of cases, however, economic results of conversion appear favourable. »

— *Adopted.*

\* \* \*

The PRESIDENT thanked all the Delegates for their collaboration. He thanked in particular Mr. HARVEY, *Special Reporter* and Mr. BIAIS, *Reporter*, for their particularly delicate work of presenting a synthesis on a question about which the opinions of many Administrations are not yet firmly made up.

Mr. UPMARK then thanked the PRESIDENT in the name of all the Delegates for the way in which he had presided over the work of the Section.

(*Loud applause.*)

— The meeting ended at 11.30 a.m.

N. B. — *The complete and final text of the Summaries adopted for Question 2 is given hereafter, page 867 to 871.*

## SECTION IV. — General.

[ 656 .23 ]

### QUESTION 3.

#### Development of railway tariffs.

#### Economic justification of these tariffs.

**Adjustment of tariffs to the new conditions of the general economic system and to the competition of the other forms of transport.**

**Function of tariffs in coordination of inland transport.**

#### Preliminary documents.

Report (*America [North and South], Australia [Commonwealth of], Burma, Ceylon, Egypt, Germany [Federal Republic], India, Indonesia, Irak, Iran, Republic of Ireland, Japan, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, United Kingdom of Great Britain and Northern Ireland and dependent overseas territories*), by Dr. O. MAIER. (See *Bulletin* for January 1956, p. 1.)

*Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Greece, Hungary, Italy, Lebanon, Luxemburg, Netherlands, Poland, Portugal and overseas territories, Rumania, Spain, Switzerland, Syria, Turkey and Yugoslavia*), by L. ANTOINE. (See *Bulletin* for February 1956, p. 107.)

Report (*Austria, Belgium and Colony,*

Special Report, by L. ANTOINE (See *Bulletin* for May 1956, p. 437.)

## SECTIONAL DISCUSSION.

### Meeting of the 4th June 1956 (afternoon).

*President* : Mr. F. Q. DEN HOLLANDER, *Chairman of the Netherlands Railways, Member of the Permanent Commission of the Association.*

— The meeting began at 3.15 p.m.

as *Vice-Presidents* :

The PRESIDENT welcomed the Delegates and stated that the Permanent Commission had suggested the constitution of the Bureau of the Section as follows :

Dr. H. GSCHWIND, President of the General Management of the Swiss Federal Railways, member of the Permanent Commission of the Association, and



Mr. M. DIAS TRIGO, Directeur des Services d'Exploitation et du Matériel de la Direction des Transports terrestres au Ministère des Travaux Publics et des Communications du Portugal, member of the Permanent Commission of the Association;

as *Principal Secretary* :

Mr. A. COLLE, Ingénieur à la Société Nationale des Chemins de fer Belges;

as *Secretaries* :

Mr. G. M. BUREAU, Agent d'Etudes Administratives Principal à la Direction Commerciale de la Société Nationale des Chemins de fer Français, and

Mr. R. H. KITCHING, Assistant to Chief Officer (Marine and Administration), British Transport Commission.

— *The Meeting signified its approval.*

The PRESIDENT, after thanking the Assembly, asked if any delegate wished to make any comments of a general nature about the question under discussion. He then called upon Mr. ANTOINE, *Special Reporter*, and asked him to introduce the subject.

Mr. ANTOINE (*Special Reporter*) stressed the importance of the problem in question. When the period of monopoly ended, the Railways, faced with the competition of other methods of transport, endeavoured to direct their tariff policy in such a way as to protect their own interests. But they found themselves up against very many different obstacles which originated in the fact that the tariffs

played a very great part in the national economy. For this reason, railway undertakings, whilst wishing to stabilise their financial equilibrium, could not do so on absolutely commercial lines. This situation explains the brevity of the special report, because of the difficulty of approving resolutions which could be followed by the different Railways.

The PRESIDENT then called upon Dr. MAIER, *Reporter*.

Mr. MAIER (*Reporter*) approved the conclusions of Mr. ANTOINE and added certain remarks of his own.

The railway is a universal method of transport. It is the best qualified to meet the demands of users, even in countries where road transport is highly developed. To maintain this position the State must pursue a policy which takes into account the competition of other methods of transport, and refrain from imposing upon the railway obligations and burdens intended for an undertaking having the character of a monopoly. In other words, it is necessary :

- 1) to bring the tariff statutes for the railway into line with those of other methods of transport;
- 2) equality compared with other methods of transport as regards the obligation to carry and to bear the cost of the road upon which they run;
- 3) equality likewise in the case of the tariffs intended to encourage certain sections of the national economy, either by giving up such a system or by compensation from the State;

- 4) a policy intended to discourage by fiscal measures the development of certain methods of transport which exceed actual transport requirements.

The realisation of such a programme would ensure healthy competition between the different methods of transport and a balanced railway budget, which would be in the interests of the general economy.

Mr. PIKE (*British Railways*) spoke of the thorough-going tariff reform introduced on the British Railways with the assistance of the Government. In Great Britain, there is now free competition between the different methods of transport.

Formerly, the railway tariffs were based on an « ad valorem » classification of freight and the obligation to treat all clients in similar circumstances equally. At the present time, the British Railways are allowed to make contracts with clients which need not be published, and every month more than 200 such contracts are made. In addition, a new tariff system has been prepared but not yet put into force. With this new system, the rates for similar types of transport are the maximum rates, within the limits of which the railway undertaking is free to fix its charges for each transport without being obliged to publish them. The maximum rate depends upon the weight and bulk (loadability) of the goods. It consists of two parts. One is the price for the first ten miles, the other a price per ton and per mile for distances exceeding ten miles. This has been fixed, taking the costs into account, at a level corresponding to adverse but not extreme circumstances.

The basis of the tariff reform is the substitution of the idea of the comparative costs to that of the comparative value of goods, and the recognition of the fact that this cost may vary, for example, according to the itinerary followed. To sum up, we are changing from a relatively rigid system to a very elastic one.

Mr. GUIBERT (*French National Railways*) stressed the question of the variation in the tariffs according to the service in question. The tariffs in the case of railway transport remain the same per kilometre whatever the place served, which is not the case with other methods of transport. To remedy this inequality, a tariff which varies according to the service can be introduced. This has been done on the S.N.C.F. in certain cases for the freight tariffs. If such a solution is not adopted, competitive transport undertakings must be made to adopt standard tariffs.

One such solution would be to introduce a system of compensation fees to be paid by undertakings with good traffic to those with poor traffic. The great majority of Governments repudiate such a solution.

The interests of the railway lie in doing away with the distortion created by a standardised tariff structure which often leads the client to choose some other transport undertaking than the railway which is really more costly than the railway as far as actual costs are concerned.

Mr. ANTOINE stated that Mr. GUIBERT was right in calling attention to the importance of the problem concerned. In his opinion, Summary No. 5 of the Special Report could be adapted to deal with



the particular aspect dealt with by Mr. GUIBERT.

Mr. LAMALLE, (*Member of Honour of the Permanent Commission*) thought that, whatever the tariff measures, the financial equilibrium of the Railway could not be achieved by this means alone. To achieve such equilibrium it is for the Governments to take steps to put all transport undertakings on an equal footing as regards bearing the cost of their routes.

For Mr. COTTIER (*Central Office for International Railway Transport*) the problem under discussion touches the three main principles of the general transport policy, which depends upon the policy of the States.

The first of these principles is the obligation to carry. In the field of international transport, all the States of Europe are subject to this. It may be asked if this obligation could not be made more flexible, since clients no longer need such protection as they can make use of other methods of transport. The second principle concerns the publication of the tariffs. From this point of view, a reform has been introduced in Great Britain but Mr. COTTIER did not think that the doing away with the publication of the tariffs was so necessary in the case of international transport. The third principle is the equal treatment of all clients. Neither European law nor national laws lay down that all users must be treated absolutely alike, but merely under the same conditions. If the Railways demand an interpretation of this criterion of equal treatment, greater flexibility might be achieved in this domain.

Mr. COTTIER also thought that the great difficulty in arriving at an adaptation of the railway tariffs to new conditions in the general economy lies in the unequal conditions of competition between the different methods of transport.

Mr. SANTORO (*Italian State Railways*) considered that the absence of any guide line in the orientation of the tariff policy of the various Railway Administrations is due to the policy of the Governments. He asked if the discussions should end in a single conclusion — to give greater liberty to make tariff moves to the railways — or whether in addition the general lines of a tariff policy to be applied when such liberty was granted should be gone into. He thought only the first point should be dealt with.

Mr. SJÖBERG (*Swedish State Railways*) greatly appreciated the three reports put before the Meeting. He thought that the tariff problem comes to choosing a tariff technique which will result in a well balanced and profitable volume of traffic. From this point of view, he would like to stress the value of the two part tariff, one part based on marginal costs, the other an annual royalty for using the railway. The application of such a tariff would be a step towards the modernisation of railway tariffs.

Mr. WANSINK (*Netherlands Railways*) paid tribute to the two reporters. The problem in question is not a fleeting one but one that must be followed up. He approved the very general character of the summaries in the Special Report, proposed their approval in the whole and thought it

would be a good policy for each Administration to put them before its own Government.

The PRESIDENT then called upon Mr. ANTOINE, *Special Reporter*.

Mr. ANTOINE considered that from the comments made two points could be retained and used as a basis for amending the text of the resolutions. The first concerned the route (infrastructure) used, which is implied in Summary No. 3. The second concerns the problem of standardised rates, a question included in Summary No. 5.

Mr. ANTOINE suggested that the Delegates who raised these points should consider whether more precise mention should be made of them in the Summaries.

The PRESIDENT asked Mr. ANTOINE to read the summaries as given in the Special Report. After this had been done, he recalled the speech made at the Official Opening by His Excellency the Minister of Transport and Waterstaat (\*). In this speech, the importance of the question under discussion was stressed. Because of this, the PRESIDENT proposed that the discussion should be resumed the next morning so that everyone would have an opportunity to reflect upon what had been said during the present meeting. In the name of all the delegates he thanked very warmly Mr. ANTOINE, *Special Reporter*, who was obliged to leave The Hague that evening. (*Applause*).

Mr. ANTOINE thanked the Meeting.

— The meeting adjourned at 5.30 p.m.

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(\*) See *Bulletin* for July 1956, p. 560 to 562.

### Meeting of the 5th June 1956.

*President* : Mr. F. Q. DEN HOLLANDER.

— The meeting began at 9 a.m.

The PRESIDENT proposed that the summaries of the Special Report should now be examined. He called upon Mr. COTTIER.

Mr. COTTIER proposed that a foreword should be included before the summaries worded as follows :

« In order to achieve a sound distribution of public and private transport in accordance with the inherent qualities of each method of transport, a more suitable adaptation of the railway tariffs to the new needs of the general economy as well as the evolution and competition of other forms of transport is called upon to play a role of primary importance.

« With this object in view in particular, the Congress calls attention to the following essential measures : »

This text would be followed by the seven summaries from the Special Report.

Mr. MAIER signified his approval.

Mr. PIKE wanted to know the meaning of the terms : new needs of the general economy ». He was in complete agreement with the fact that the tariffs should be adapted to new requirements but did not see why Mr. COTTIER included national considerations.

Mr. COTTIER said he was inspired to do so by the title of the question. We have very heavy production in the industrial section. This exceptional economic conjuncture encourages transport. This corresponds to a new situation in the general economy.

Mr. PIKE said he was in complete agreement with Mr. COTTIER if it was his intention to suggest that it is high time the railway undertakings adapted their tariffs to modern conditions. We would have preferred to discuss the reform of railway tariffs at greater length, rather than torment ourselves with the subject of our burdens and obligations.

After an exchange of opinions on questions of detail, the French and English texts of the foreword were adopted.

*The final text was worded as follows :*

« In order to achieve a sound distribution of traffic, both public and private, in accordance with the inherent qualities of each method of transport, the most suitable adaptation of railway tariffs to meet the new needs of the general economy, as well as the evolution and the competition of other forms of transport, is called upon to play a role of primary importance. With this object in view, the Enlarged Permanent Commission of the International Railway Congress Association have arrived at the following conclusions : »

The PRESIDENT suggested that the summaries should be read through again.

Mr. MAIER read Summaries 1 and 2 :

*Summary No. 1 :*

1. It is essential that the policy of the States regarding the use to be made of railway transport should be defined within the framework of the general national transport policy.

*Summary No. 2 :*

2. The permanent financial soundness of railway undertakings is an objective that must be achieved.

In agreement with Mr. GSCHWIND, *Vice-President, (Swiss Federal Railways)* the PRESIDENT suggested changing over Summaries 1 and 2, the permanent financial soundness of the railway being so important that this should be stressed right at the beginning.

Mr. MAIER asked Mr. GSCHWIND if he wanted to make a distinction between the suggestions made to the Governments and those addressed to the Railways themselves.

Mr. GSCHWIND replied that he would prefer to place the general conditions at the beginning of the summaries. If the general conditions are not fulfilled, the question of the tariffs is no longer necessary.

Mr. DARGEOU (*French National Railways*) thought that Summary No. 1 being more general in scope should come before Summary No. 2, which concerns the railways in particular. He suggested combining these two summaries.

Mr. COTTIER declared that the financial stability of the railway undertakings is one of the primordial objects. The tariff policy is only one method of equilibrium amongst others (modernisation of the equipment, electrification, etc.). It would be as well to start with Summary No. 1 so that the State should decide to define the general scope of the economic mission of the railways.

Mr. LAMALLE did not see any advantage in changing the order of the summaries. Only the ideas contained in them should be retained.



Mr. BLEE (*British Transport Commission*) thought that Summary No. 1 had very little to do with the question under discussion. It seemed to him that this question is to study by what means an adequate tariff policy can be used to co-ordinate transport. These methods would be based upon studies of the costs for rail and road which would make it possible to decide the limits of the sphere of activity in which each method of transport is the more efficient.

Mr. MAIER suggested adopting Mr. DARGEOU's idea of combining the two summaries.

After the delegates had come to an agreement, the PRESIDENT read the new Summary No. 1 :

« 1. It is essential that the policy of the States regarding the use to be made of railway transport should be defined within the framework of the general national transport policy.

« In this connection the permanent financial soundness of railway undertakings is an objective that must be achieved. »

— *The new Summary No. 1 was adopted.*

Mr. MAIER at the invitation of the PRESIDENT then read Summary No. 3 (former) now to become No. 2.

3. It is desirable that in so far as the railways are allowed to suffer from the competition of other methods of transport, they should receive equal treatment as far as possible.

He recalled that Mr. LAMALLE suggested the evening before that the question of the cost of the route used should be included in equality of treatment.

Mr. DARGEOU thought that it would be incomplete if any particular question were considered. For example fiscal equality, which is equally important, would be overlooked.

Mr. COTTIER thought that the question of fiscal equality could be included in Summary No. 6 if this were included in the determination of equitable compensation. Speaking of the route, Mr. COTTIER thought that the establishment of the real costs of certain transports should be speeded up.

Messrs PIKE and WANSINK were of the same opinion as Mr. DARGEOU. The merit of M. ANTOINE's summaries was that they were general in character.

After a brief exchange of opinions upon questions of detail, the final text of new Summary No. 2 was read by the PRESIDENT :

« 2. It is desirable that, in so far as the railways are subject to competition from other methods of transport, they should in all matters receive equal treatment as far as possible. »

— *This text was adopted.*

Mr. MAIER then read Summary No. 4 (former).

4. In the field of the tariffs, the first objective should be first of all to cover the costs separately in each of the two sections « passenger » and « freight ».

Mr. SANTORO thought it would be preferable to place points 6 and 7 before point 4 which sums up the conclusions regarding the tariffs whereas 6 and 7 give the general framework.

The *Summaries Nos. 6 and 7 (former)* were read.

*Summary No. 6 :*

6. The obligations surviving from the era of monopoly, to the extent that they cannot be cancelled, should be fairly compensated to the profit of the undertakings.

*Summary No. 7 :*

7. Co-ordination measures should be defined within the general transport policy but also taking into account their consequences upon the railways, as well as the special obligations of the latter as a public service and the fact that they cannot act on a strictly business basis like their competitors.

The Meeting agreed, and Summary No. 6 (former), after brief comments from Messrs COITIER, DARGEOU and PIKE, is adopted as Summary No. 3 with the following text :

« 3. The obligations of every kind which have survived from the era of monopoly, to the extent that they cannot be cancelled, should be fairly compensated to the benefit of the railway undertakings. »

The meeting then went on to consider the former Summary No. 7. Mr. MANITTO TORRES (*Former Portuguese State Railways*) asked for the following text to be added :

« Tariff difficulties being the direct consequence and most certain indication of present day railway operating difficulties, it seems fitting to consider in parallel with this question the following circumstance : In principle, and in the future, provision should be made immediately to see that the railway by means of careful organisation becomes the organic and executive centre of all tributary transport, not only by rail but also by road and by inland navigation. »

Mr. MAIER thought that this addition was hardly called for, and that it was in

contradiction to Summary 2 calling for equality of treatment for all methods of transport.

Mr. PIKE was of the same opinion. The question of a single control for road, rail and water is a purely political question outside the framework of the subject under discussion.

Mr. BLEE in his turn suggested replacing the former point 7 by a new text :

« The function of tariffs in the coordination of inland transport is to influence the customer to place his business with that form of transport, be it railway or road, which can, on sound costing techniques, most economically carry the traffic. This presages a full knowledge by the railways of both railway and road costings and the founding of tariffs and charges upon them modified in an upward direction according to the price which can be obtained on the market. »

Mr. WANSINK whilst recognising the importance of Mr. BLEE's text thought that it fitted in better with summaries Nos 4 and 5 (former) than with the text now under discussion.

Mr. SANTORO asked whether there was not a contradiction between point 7 and M. BLEE's suggestion. On the one hand, we were asking for measures of co-ordination, and on the other, accepting almost complete liberty under the supposition that suitable tariffs would automatically regulate the transport market.

The PRESIDENT proposed maintaining purely and simply the former text and discussing Mr. BLEE's suggestion when examining Summary No. 5 (former).

Mr. MANITTO TORRES agreed on the rather revolutionary character of his suggestion and said he would not insist upon its being added to the summaries.

Mr. COTTIER stressed the importance of Mr. MANITTO TORRES' suggestion. In Switzerland, since 1945, the legal possibility of running road or air services is open to the railways. He pointed out that Summary 1 reserved the right of the States to set up a general transport undertaking.

Mr. LAMARQUE (*French National Railways*) suggested an introductory sentence before point 7 : « In any case, co-ordination of the different means of transport remains necessary. »

This suggestion was agreed to, and the PRESIDENT read the amended text of Summary No. 7 (former 7), which becomes the *new Summary No. 4* :

« 4. In any case, co-ordination of the different means of transport remains necessary. Co-ordination measures should be defined within the general transport policy but also taking into account their consequences upon the railways, as well as the special obligations of the latter as a public service and the fact that they cannot act on a strictly business basis like their competitors. »

The meeting then went on to consider the former Summary No. 4.

4. In the field of the tariffs, the first objective should be first of all to cover the costs separately in each of the two sections « passenger » and « freight ».

Mr. SJÖBERG thought it was better to put this summary after Summary No. 5

(former), which speaks of the attempts to relate the tariffs to the costs. The former point 4 is one of the ways of doing this.

After an exchange of views between Messrs SJÖBERG, PIKE, WANSINK, BLEE and the PRESIDENT, the Meeting agreed and adopted the text of former Summary 4 as it stood, which now becomes Summary No. 6 :

« 6. In the field of the tariffs, the first objective should be first of all to cover the costs separately in each of the two sections « passenger » and « freight » ».

The PRESIDENT invited the meeting to discuss the last summary to be examined (No. 5) in conjunction with the formula previously suggested by Mr. BLEE.

5. The efforts made by the railways to revise their tariffs and bring them in line with the actual costs should be encouraged.

The greater flexibility required in the face of competition should be authorised and facilitated in relation naturally with the factors of the specific costs which must be taken into account.

Mr. GUIBERT recalled his remark of the evening before and suggested inserting between the two paragraphs of the summary a text stressing that the existence of private transport which is not regulated in any way will aggravate the situation if common measures are not adopted.

Mr. BLEE suggested including Mr. GUIBERT's remark in his suggestion by adding the following sentence :

« Tariffs cannot become a factor in the coordination of transport, unless providers of transport have complete flexibility in fixing the tariffs. »



The PRESIDENT stated that co-ordination and liberty did not mean the same thing as far as he was concerned.

Mr. BLEE explained his point of view. To co-ordinate transport, the Governments can adopt various measures. Co-ordination by price is one method that should not be overlooked. In other words, if the Government leaves it to the customer to choose the method of transport freely, he will go to that undertaking which satisfies his requirements at the best price.

Mr. SANTORO thought that the text of Summary No. 5 could be kept as worded by Mr. ANTOINE. In his opinion, the problem of rates to suit the lines is not sufficiently ripe to justify a general summary. As regards Mr. BLEE's suggestion, it seemed dangerous to him to make it appear that the tariff policy is capable of solving the problem of co-ordination.

Mr. WANSINK stressed the interest of the Mr. BLEE's and Mr. GUIBERT's remarks. To decide the text of Summary 5, he suggested a small revision committee.

The PRESIDENT approved this idea and asked Messrs MAIER, BLEE, GUIBERT and SJÖBERG to hold a brief meeting with this object.

*(The meeting adjourned at 12.15 and began again at 12.45.)*

Mr. MAIER explained that the committee had looked for a short text which would not go into too many details whilst touching upon the essential points discussed. He read this text :

« 5. The efforts made by the railways to revise their tariffs, and bring them in line with the actual costs and market conditions should be encouraged with the object of obtaining a more rational distribution of traffic between the different means of transport.

« The flexibility required in the face of competition should be authorised and facilitated in relation naturally with the factors of the specific costs which must be taken into account. »

After a brief exchange of opinions, this text was adopted as final Summary No. 5.

The PRESIDENT then made a short closing speech. He thanked the Delegates for attending and for their efforts in connection with this most important question discussed during these meetings. He expressed also his thanks to the Reporters for the hard task they had assumed.

Mr. DARGEOU, on behalf of the Meeting, thanked the PRESIDENT, the Reporters and the Secretaries (*Applause*).

— The meeting ended at 1 p.m.

— *The complete and final text of the Summaries adopted for Question 3 is given hereafter on pages 872 and 873.*

# INTERNATIONAL RAILWAY CONGRESS ASSOCIATION

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*Enlarged Meeting of the Permanent Commission at The Hague-Scheveningen*

(4th to 6th June, 1956.)

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## Plenary Meeting held on the 6th June, 1956. PROCEEDINGS.

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Mr. M. DE VOS, *President of the Association, in the Chair.*

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— The Meeting opened at 10 a.m.

The PRESIDENT declared that the only item on the Agenda was the ratification of the Summaries adopted by the Sections during the technical Meetings.

He called upon Mr. GHILAIN, *General Secretary*, to read in turn the Summaries.

Mr. GHILAIN read out the Summaries relative to Questions 1, 2 and 3.

— *No objection was raised during this reading and the PRESIDENT stated that the Summaries were adopted.*

— The Plenary Meeting was immediately followed by the closing ceremony of the Enlarged Meeting, of which a brief account was given in our *Bulletin* for July 1956.

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The final text of the Summaries adopted is reproduced hereafter.

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## SUMMARIES

**adopted at the Plenary Meeting of the Permanent Commission  
of the 6th June 1956.**

### SECTIONS I AND III : WAY AND WORKS — WORKING.

#### QUESTION 1.

**Research on the economic usefulness and the technical opportunity to install a third track, serving for common use (banalisation), in addition to sections of double track lines with heavy traffic, instead of installing two double track lines on such sections.**

**Consequences of the installation of a third track for use in either direction on the conditions necessary to insure the safety of train movements.**

#### Summaries.

**A. Traffic considerations to be taken into account in the study of the various means available to increase the capacity of a double track line.**

« 1. — When on a double-track line  
« with a very heavy traffic, it becomes  
« necessary to contemplate increasing  
« the number of movements or of sub-  
« stantially improving the operating po-  
« sition, it is expedient at the outset to  
« study all the means of increasing the  
« efficiency of the two tracks in order  
« to take full advantage of the potential  
« offered by the line; for instance, im-  
« provement of the track lay-out in the  
« stations, provision at these stations of  
« interlocking installations, achieving  
« greater uniformity in speeds, provision  
« of automatic block signalling with  
« short sections, provision of complete  
« signalling schemes, two-way working  
« (banalisation) on one or both tracks of  
« the line.

« The efficiency of two-way working  
« requires that, at certain periods, the  
« density of the traffic in the two direc-  
« tions shall be unequal, either in res-  
« pect of the number of movements or  
« in the duration of line occupation; the  
« advantages are increased when traffic  
« peaks in one direction occur at the  
« periods marked by an almost complete  
« lull in traffic in the other direction.

« 2. — In the case where, owing to  
« the volume and characteristics of the  
« traffic, the above mentioned measures  
« would not offer a satisfactory solution,  
« it is necessary to examine from the  
« three view-points of traffic require-  
« ments, technical factors and economic  
« considerations, the value of adopting  
« one or the other of the following two  
« solutions: the construction of a third  
« track, or quadrupling.

« These two solutions have one factor  
« in common — one track reserved for



« each direction of movement, allowing  
« a same basic traffic; to compare the  
« two solutions, it is therefore necessary  
« to take into account the movements  
« it is considered desirable to transfer  
« from these tracks.

« 3. — In examining the movements  
« in the one direction over a heavily  
« used section of line, one can have  
« either a mixture of trains of widely  
« varying speeds, a situation characteris-  
« tic of the majority of railway routes,  
« or groups of trains at close intervals  
« in the same direction, which, indepen-  
« dent of differences in speed, occur at  
« the same time on the section. The  
« necessity for using the two tracks for  
« traffic in the same direction arises  
« from the fact that the number of trains  
« running in the peak periods exceeds  
« in time occupation the operating capa-  
« city of one track, after due allowance  
« has been made for the necessity of  
« not excessively sacrificing the running  
« of slow trains by holding them for  
« unduly long periods and at frequent  
« intervals.

« Variations in the speed of the trains  
« constitute an important factor in  
« requiring on certain sections of line  
« an increase in the number of tracks  
« to allow the overtaking, without stop-  
« ping, of slow trains by the faster  
« trains.

« 4. — Movements can comprise an  
« unbalanced pattern with peaks exceed-  
« ing the capacity of one track and  
« which occur always in one direction  
« only (either in a permanent direction  
« — up gradient for example — or in  
« opposite directions but at different

« periods). In this situation the pro-  
« vision of a third track (respectively  
« without two-way working and with  
« two way working in the second) offers,  
« in principle, a satisfactory solution.  
« Overtaking without stopping is prac-  
« ticable in one direction only if the  
« third track is not equipped for two-  
« way working, or if it is so equipped,  
« it becomes practicable in the two  
« directions but at different moments of  
« time.

« On the contrary, if traffic peaks,  
« each exceeding the capacity of one  
« track, occur at the same time in both  
« directions of movement, quadrupling  
« is, in principle, the most likely solu-  
« tion. With this situation, a third track  
« in common use could be contem-  
« plated in certain circumstances and  
« with certain limits of traffic, but it  
« would be necessary to carry out on  
« this track true crossing movements as  
« on a single-track line.

« 5. — On any track used in one  
« direction only, the *theoretical track*  
« *capacity* is determined by the time  
« taken to pass through the longest  
« block section as measured in time. In  
« practice, the mixed nature of the traf-  
« fic (variations in speeds and in the  
« priority of trains) and out of schedule  
« running, as can always arise, make it  
« necessary to regard the *true capacity*  
« as being substantially below (average  
« value 0.7 to 0.8 of the theoretical  
« capacity); time losses occur in actual  
« traffic conditions through the need  
« to give second place to slow and less  
« important trains in relation to the  
« faster and more important trains using  
« the same track (cases of overtaking

« either as provided for in the timetable  
« or as necessitated by trains running  
« out of course).

« 6. — When a second track is  
« available in one direction, this permits  
« at least of doubling the initial capa-  
« city, and, by a careful allocation of  
« the fast and slow trains on the diffe-  
« rent tracks, it can even lead to a better  
« user of the two tracks considered  
« together.

« With a third track, the degree of  
« the increase in capacity is related to  
« the nature of the movements using the  
« third track; it varies according to  
« whether these consist either of groups  
« of trains in the one direction at close  
« intervals (the situation most favourable  
« to high capacity) or of numerous  
« movements in the two directions,  
« which in practice gives rise to the dif-  
« ficulties normally met with on single-  
« track lines. For this reason, the in-  
« crease in capacity with a third track  
« can only be measured in relation to  
« the different situations and then only  
« approximately.

« 7. — In regard to the actual use  
« of the tracks for a given traffic, qua-  
« drupling, in principle, allows of a  
« higher degree of specialisation, while  
« on a line with a third track, the neces-  
« sity to divert trains from one track  
« to another, according to circumstances,  
« and even contrary to the booked  
« working arrangements, is generally  
« more frequent.

« The necessity of diverting trains  
« from one track to another, and, in the  
« event, of undertaking on the track  
« equipped for two-way working true

« crossing movements, as on a single-  
« track line, makes it essential above  
« all else to provide on the third track  
« a complete and rapid system of regu-  
« lating, which alone allows of substan-  
« tial flexibility in working, reflecting  
« itself in an increase in operating capa-  
« city. »

#### **B. Examination of the characteristics of the facilities necessitated by traffic considerations.**

« 8. — With the solution « qua-  
« drupling », the necessity of diverting  
« trains from one track to the other used  
« in the same direction being a less fre-  
« quent event, cross-overs will, in gene-  
« ral, be provided only at stations. In  
« the specific case of a section of line  
« with four tracks, where mixed working  
« according to circumstances over the  
« two tracks in the same direction has  
« to be provided for, it will be useful  
« to locate these tracks next to each  
« other and to install some additional  
« cross-overs between stations.

« 9. — With the solution « three  
« tracks », it is generally the view that  
« the centre track should be the one  
« equipped for common user as this  
« reduces to a minimum conflicting  
« movements. The third track placed  
« « outside » may be preferable in spe-  
« cific situations, when the slow trains  
« are on one and the same side of the  
« line in order that they can run along-  
« side the station facilities at interme-  
« diate points and to facilitate shunting  
« of the trains. In such a case it should  
« be possible in principle to run this  
« traffic on the third track alone, or

« with the use of the adjacent track for  
« one direction only.

« 10. — On a line with three tracks,  
« in so far as the diversion of trains  
« between the one-way tracks and the  
« track in common user (« voie bana-  
« lisée ») is concerned, it is necessary  
- « to divide the track into independent  
« sections in such a way as to allow of  
« operation by sectional two-way work-  
« ing (« banalisation partielle »); it is  
« desirable for this purpose to install  
« between the one-way tracks and the  
« track in common user, connections  
« with a small angle of turn-out so as  
« to avoid the need for unduly severe  
« reductions in speed by the trains pas-  
« sing through them and to allow these  
« trains, if possible, to run through  
« them at the maximum speed permitted  
« on the less favourable of the two  
« tracks concerned.

« Sidings have to be installed where  
« it is necessary to consider holding  
« trains near the crossings and at con-  
« venient locations.

« At junctions where a direct connec-  
« tion to the track in common user  
« would give rise to fouling movements,  
« it will be usual to have recourse to a  
« fly-over or burrowing junction.

« 11. — As the cross-overs on the  
« track in common user constitute con-  
« verging junctions, it follows, as in all  
« similar cases, that both-way (bana-  
« lised) tracks should be provided with  
« a complete and clear signalling system,  
« and that the locomotives using these  
« tracks should be equipped with suit-  
« able devices such as cab-signals or  
« automatic train-control to ensure ab-  
« solute obedience of signals.

« 12. — Since it is particularly  
« necessary, in operating with three  
« tracks, to avoid all unnecessary loss of  
« time — whether it be in the selection  
« of the track to be used, in the deter-  
« mination of the crossing places, or in  
« the general regulating of the traffic —  
« automatic block signalling and centra-  
« lised traffic control (C.T.C.), capable  
« of effecting at the maximum speed  
« remote indication and control, are to  
« be recommended. This C.T.C. offers  
« the maximum operating advantages  
« when the dispatcher directly controls  
« the routes themselves and has the pos-  
« sibility of storing them.

« 13. — The regulating is again im-  
« proved by making available to the  
« dispatcher the most complete and up-  
« to-date apparatus, such as automatic  
« train describers (or automatic graph  
« recorders). The use of radio commu-  
« nication with the drivers of trains may  
« facilitate still further the task of the  
« dispatcher.

« 14. — In general, quadrupling can  
« be planned without C.T.C., as less  
« frequent intervention is then necessary  
« for train regulating purposes. »

### C. Economic considerations.

« 15. — Three tracks, above all when  
« there is a two-way track in the centre,  
« can render necessary consequential  
« major alterations in the lay-out of the  
« existing tracks and signalling. These  
« alterations, in that they are carried out  
« on a line already conveying heavy  
« traffic, may result in an increase in the  
« cost of the scheme.

« On the other hand, quadrupling, or



« a third track laid outside, can be  
« planned and constructed, in certain  
« cases, with a minimum of alterations  
« and of difficulties on the double-track  
« line already in service.

« 16. — The ratios between the costs  
« for the installation of a third track and  
« for quadrupling naturally vary accord-  
« ing to local conditions. In the deter-  
« mination of these costs and their ra-  
« tios, it is necessary in the first place  
« to take into consideration, on the one  
« hand, local geographical conditions,  
« which according to circumstances will  
« make the quadrupling easy or diffi-  
« cult, and, on the other hand, the lay-  
« out more or less complex as the case  
« may be, at the stations to be adapted.  
« The ratio between these costs for the  
« two solutions, in the cases investigated,  
« varied from 0.6 to 0.85, but it could,  
« in exceptional situations, take values  
« outside these limits.

« 17. — In practice, the inter-depen-  
« dence of the many factors which are  
« involved in the efficiency and regul-  
« arity of the service makes it very dif-  
« ficult to give a precise estimate in  
« advance of the results to be expected  
« from one or the other of the two solu-  
« tions under examination. One me-  
« thod, for example, lies in establishing  
« graphically for each of the two solu-  
« tions theoretical timetables based on  
« traffic requirements and on the operat-  
« ing possibilities offered by the lay-out,  
« and then to compare the results ob-  
« tained, taking into account as far as  
« possible the ability of each to deal  
« with out-of-course working conditions.  
« From this comparison, theoretical

« data can be ascertained in respect of  
« the number of train-hours, and from  
« these calculated, with due allowance  
« for effective utilisation, the expen-  
« diture in terms of vehicle-days, the use  
« of motive power, train crews, etc.

« 18. — The economies in staff at  
« stations and in signalling are above all  
« related to the adoption of centralised  
« signal boxes at stations, of automatic  
« block signalling and of centralised  
« traffic control, with remote control of  
« points and signals. With this last  
« mentioned installation, which in cer-  
« tain cases allows of the achievement of  
« very substantial economies in staff at  
« stations and on signalling duties, it is,  
« however, necessary to take into consi-  
« deration the possible need to retain at  
« various points staff who can take the  
« requisite action when incidents of all  
« kinds occur.

« In general, the estimates in respect  
« of expenditure on staff at stations and  
« for signalling duties can only be esta-  
« blished in advance for the different  
« solutions examined, with a consider-  
« able degree of approximation.

« 19. — In regard to maintenance  
« expenditure on way and works, it is  
« equally possible to establish in ad-  
« vance estimates sufficiently accurate  
« for the two solutions — the provision  
« of a third track and quadrupling. It  
« will also be necessary to take into  
« account the expected requirements in  
« staff and equipment in the light of  
« the nature and arrangements of the  
« installations, and according to the  
« annual user of each track, expressed,  
« for example, in :

«  $\frac{\text{total ton-kilometres}}{\text{kilometre}}$        $\frac{\text{train-kilometres}}{\text{kilometre}}$   
    and

« 20. — On the basis of operating expenses determined as above and of capital charges (interest and depreciation) it is possible to proceed to calculate the total annual expenses for each of the two solutions contemplated, and finally to estimate in approximate terms the expenses per unit of movement and per unit of traffic. »

**D. Limits to the application of a third track in common user (triplement avec banalisation).**

« 21. — The solution « three tracks », which, in principle, is less costly than quadrupling, can only be considered if the traffic peaks present certain clearly defined characteristics.

« Even if traffic conditions are in favour of « tripling », the quadrupling renders more easy the making of, and adherence to timetables and ensures a greater capacity advantages, which would be likely to lead to it being given preference from the operating point of view, the more so if account is taken of future needs.

« 22. — On lines carrying a very heavy traffic the « third track in common user » may be preferred where the cost of quadrupling is much higher as is normally the case, particularly where the configuration of the ground is a factor. The most characteristic examples are the following :

« a) common sections, near to large towns, with high cost of land or major civil engineering works necessary with

« quadrupling; a case typical of sections of line common to suburban and main line traffic with peaks in one direction only in the morning, at midday and in the evening.

« b) short sections interposed between four track sections, because of the incidence of major engineering obstacles too expensive to quadruple.

« 23. — In addition to the cases cited, the provision of a third track, with or without common user (according to circumstances) may be sufficient for traffic requirements on sections of line carrying traffic having substantial differences in speed, sections where it is specially important to allow overtaking without stopping the trains.

« 24. — The fact that many Railways only had for a long time an insufficient experience of the potentialities offered by centralised traffic control, both from the traffic and technical points of view, can have led more easily in the past, to neglect the solution « third track in common user ». At present, in the light of technical progress, the risk of a C.T.C. installation being put out of service accidentally is slight, and this cannot constitute a factor sufficient to reject this solution.

« 25. — In the future, the provision of a third track in common user will, it seems, be adopted more frequently than in the past even if its scope for application to lines with very heavy traffic remains limited in general to relatively short sections with special characteristics. »

## SECTION II : LOCOMOTIVES AND ROLLING STOCK.

## QUESTION 2.

In a system of standard, narrow or broad gauge lines which has Diesel traction for shunting and for main line working, what are the conditions governing :

- 1) the choice of the characteristics and kind of transmission;
- 2) the most economical organisation, maintenance and operation.

Research into savings that might be possible in comparison with steam traction.

## Summaries.

« 1. — The formula according to which the whole power is concentrated in a single locomotive is that which produces the lowest capital and maintenance costs. However, dividing up the power required between two locomotives conduces to more flexible working. Moreover, it is desirable to do so at the present time whenever the power required exceeds 2 500 HP.

« Multiple unit locomotives, which can only be run as multiple units, are now in use in the U.S.A.

« 2. — It is obviously advantageous to reduce the number of classes of locomotives. It is also advantageous to provide standard equipment, common to several classes, at least in the case of the auxiliary equipment.

« 3. — Under commercial transport conditions as found in *Europe*, it is difficult for any single class of locomotive to be suitable for hauling all the different categories of trains. It appears necessary to provide one class

« of locomotive intended for fast or heavy mixed traffic on the main lines (1 500 to 2 500 HP or over), and one or several classes of locomotives for mixed traffic on the main and secondary lines (750 to 1 500 HP) and for the traffic on the secondary lines as well as for shunting if necessary (less than 750 HP).

« 4. — In the case of shunting, for the different kinds of services, there are three corresponding classes of locomotive, the powers of which are :

« — for shunting in the small stations and shops : less than 200 HP;

« — hump shunting and branch line services : 350 to 600 HP;

« — heavy shunting and transferring rakes : 600 to 800 HP.

« In some countries, these powers may be exceeded. They largely are in the U.S.A. where they may be as much as 1 000 to 1 600 HP.

« 5. — The axle arrangement depends upon the axle loads allowed by



« the track. In the case of the line  
« locomotives, the type AIA-AIA is  
« that most used on light track. The  
« BB and CC types are widely used on  
« standard gauge lines.

« Some of the railways on the Conti-  
« nent consider that the BB type is the  
« most economical up to 1 700 HP as  
« far as wear of the track and tyres is  
« concerned, whereas others prefer the  
« CC and even the IC-CI type.

« However, up to the present, insuf-  
« ficient data is available to determine  
« which axle arrangements gives the  
« greatest saving as regards permanent  
« way maintenance.

« In the case of locomotives of aver-  
« age power running at less than 60 km  
« (37 miles)/h, parallel axles from the  
« type B to the type D can be used. In  
« other cases, bogie locomotives are  
« preferable.

« 6. — Diesel engine technique can  
« now provide reliable and powerful  
« engines, and the tendency is to prefer  
« single-engined locomotives. However,  
« for special reasons (standardisation,  
« type of transmission) two-engined lo-  
« comotives may be preferred.

« When specially trained labour is  
« available, or can be trained to make  
« sure the maintenance work is properly  
« carried out, it is not considered advis-  
« able to sacrifice the efficiency of the  
« Diesel engine.

« On some Railways, where the  
« recruiting of trained labour for main-  
« tenance and the supply of spare parts  
« present a serious problem, it may  
« however be desirable to look into the  
« advisability of using a simple lower

« efficiency Diesel engine of a well tried  
« type.

« 7. — In the U.S.A., the 2-stroke  
« engine is the more widely used; in  
« Europe the 4-stroke engine is more  
« generally used.

« However, several European Admi-  
« nistrations have put into service Diesel  
« locomotives fitted with two-stroke  
« engines. They are, however, not yet  
« in a position to make any statement  
« on the final balance sheet of the res-  
« pective advantages and drawbacks of  
« two and four-stroke engines.

« 8. — The provision of a single driv-  
« ing compartment permits a reduced  
« cost of construction. However, the  
« requirements of visibility may neces-  
« sitate the provision of a compartment  
« at each end.

« For this reason on locomotives  
« working train services the arrangement  
« with a compartment at each end  
« appears desirable. On shunting loco-  
« motives, however, the single compart-  
« ment is preferred. Certain Railways  
« state that this should be in the centre  
« of the locomotive and others at one  
« end.

« 9. — From the information receiv-  
« ed, it appears that in the majority of  
« cases mechanical transmissions are  
« used for relatively low powers; elec-  
« tric transmissions for high powers.

« Hydraulic transmissions compete  
« with the other two types at medium  
« powers. However, some satisfactory  
« arrangements of hydraulic transmis-  
« sion for higher powers have recently  
« been effected.

« 10. — Fitting a « dead-man's device » is to be recommended on line « locomotives driven by one man. It « may also be of value when the locomotive has a crew of two men.

« Certain Administrations do not consider it necessary to fit this device on « shunting locomotives, even when they « are manned by only one person.

« 11. — The trains are heated either « by steam heating or electric heating, « according to the kind of equipment in « the rolling stock being hauled.

« In the case of steam heating — the « most widely used — the steam boiler « is preferably installed on the locomotive. Boiler-vans present a difficulty to the operating staff in many « cases such as terminals.

« 12. — Diesel locomotives can be « driven by one man.

« 13. — Diesel locomotives are capable of common user. They, therefore, permit the best use of locomotives and staff. It is an advantage for « the staff to be trained to drive the « different classes of locomotives and « railcars.

« 14. — In the case of secondary « lines, when possible, it is advantageous « to use the same locomotives for the « train services and for shunting operations in the stations involved.

« It may be of value to modify the « method of operating on certain lines, « both to improve the service and to « obtain a better user of the locomotives.

« 15. — It is possible to entrust the « driving of the small locomotives to

« the station staff of the stations where « they are in use. This staff must then « be trained and supervised, and provision made for carrying out small « maintenance jobs on the spot.

« 16. — From the information supplied by the Administrations, it appears that in a general way, time of « service is about 20 %. Some Administrations, however, report lower « figures than this. So far as rates of « utilisation are concerned, which are « essentially dependent upon the services « in operation, they frequently reach « 60-70 %.

« 17. — Owing to the greater availability of the Diesel locomotive, it is « possible to work an identical service « with an appreciably smaller number « of locomotives with Diesel traction « than with steam traction. Compared « with the stock of steam locomotives « and so far as operating conditions « (traffic density, etc.) allow, the stock « of Diesel locomotives replacing them « is generally in the ratio of 0.6 to 0.8.

« 18. — The periods between the « different inspections and overhauls can « be determined either by the mileage « or the number of days or hours in « service. The mileage basis gives a « fairly close indication of the condition of the engine and the locomotive. « The time basis is more convenient to « follow for the maintenance services. « An intermediate method is to base the « inspections on the number of days or « hours in service and the overhauls « on the mileage.

« 19. — It is recommended that analyses of the lubricating oils and spec-

« tographical examinations of the ash  
« be made in order to obtain informa-  
« tion on the advisability of making an  
« oil change or carrying out preventive  
« repairs on some engine component.

« 20. — As with other methods of  
« traction, maintenance includes on the  
« one hand preventive inspections, and  
« on the other overhauls according to a  
« predetermined programme. Whether  
« this is based on « mileage » or « time »,  
« there is a whole scale of inspections  
« corresponding to the amount of work  
« to be done. Between two general  
« overhauls of the locomotive, the  
« engine is given a part overhaul with-  
« out being dismantled.

« In most cases, the overhaul periods  
« laid down when the Diesels were  
« put into service would appear from  
« experience to be capable of being  
« increased. It appears that the most  
« economic maintenance policy is to  
« make high grade repairs at longer  
« intervals.

« 21. — Care must be taken to see  
« that the water used for cooling the  
« engine is neither corrosive nor scale-  
« forming.

« 22. — Provided certain rearrange-  
« ments are made, it is possible to make  
« use of the steam traction installations.  
« Such rearrangements affect the entry  
« and exit lines (installations of fuel, oil,  
« water and sand supplies) and the sid-  
« ings in the shed (making inspection  
« platforms, mobile hoods to draw off  
« the exhaust gases, etc.). In mixed  
« sheds, it is recommended that separate  
« installations be reserved for Diesel  
« traction.

« 23. — The stocking and supplying  
« of the fuel-oil requires at least two  
« tanks, one of which is a spare and  
« settling tank. Expressed in days of  
« average consumption, the total capa-  
« city of a distribution centre varies  
« between 20 and 40 days; the settling  
« period varies according to the quality  
« of the fuel-oil. There is a tendency  
« to give up centrifuging the fuel  
« and towards perfecting the filtering  
« methods.

« 24. — Since the Railway Admi-  
« nistrations find themselves obliged to  
« renew a certain proportion of their  
« stock of steam locomotives, it is na-  
« tural that they should change over to  
« a method of traction which shows  
« operating economies which are more  
« or less marked according to the type  
« of service, under the following three  
« headings: power, driving costs and  
« shed costs.

« a) As regards fuel, the economy  
« depends on the comparative cost of  
« coal and fuel-oil, including taxes. In  
« most cases, especially in the case of  
« shunting, very substantial economies  
« have been recorded.

« b) As regards driving staff, the eco-  
« nomies are considerable when only  
« one man is needed on the locomotive.  
« Even in other cases, they are sub-  
« stantial, simply on account of the  
« better user of the staff.

« c) As regards shed costs, economies  
« of more than 40 % may be obtained.

« 25. — Economies under the head-  
« ing maintenance have been recorded  
« by some Administrations. It is too



« soon to express a definitive opinion on  
« this subject.

« 26. — Apart from strictly economic considerations, there are others, such as the improvement of passenger transport conditions, the improvement of working conditions for the driving and maintenance staff, and the greater flexibility of working. In African countries, doing away with the perennial problems of water and coal is an appreciable advantage.

« 27. — At the present time, it is difficult to assess the economic repercussions of dieselisation on departments of the railway other than the Locomotive Running Department

« (Motive Power). In particular, it is not yet possible to say how the permanent way maintenance costs and operating receipts will vary, all other things remaining equal. The considerable reduction in the risk of fires along the tracks can however be mentioned.

« 28. — In general moreover, the difficulty the Administrations have found in presenting a complete economic balance sheet shows that it is still too early for all the conclusions on the economic aspects of dieselisation to be drawn. In an increasing number of cases, however, economic results of conversion appear favourable. »

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## SECTION IV : GENERAL.

## QUESTION 3.

## Development of railway tariffs.

## Economic justification of these tariffs.

Adjustment of tariffs to the new conditions of the general economic system and to the competition of the other forms of transport.

## Function of tariffs in coordination of inland transport.

## Summaries.

« In order to achieve a sound distribution of traffic, both public and private, in accordance with the inherent qualities of each method of transport, the most suitable adaptation of railway tariffs to meet the new needs of the general economy, as well as the evolution and the competition of other forms of transport, is called upon to play a role of primary importance. With this object in view, the Enlarged Permanent Commission of the International Railway Congress Association have arrived at the following conclusions :

« 1. — It is essential that the policy of the States regarding the use to be made of railway transport should be defined within the framework of the general national transport policy.

« In this connection the permanent financial soundness of railway undertakings is an objective that must be achieved.

« 2. — It is desirable that, in so far as the railways are subject to competition from other methods of transport, they should in all matters receive equal treatment as far as possible.

« 3. — The obligations of every kind which have survived from the era of monopoly, to the extent that they cannot be cancelled, should be fairly compensated to the benefit of the railway undertakings.

« 4. — In any case, co-ordination of the different means of transport remains necessary. Co-ordination measures should be defined within the general transport policy but also taking into account their consequences upon the railways, as well as the special obligations of the latter as a public service and the fact that they cannot act on a strictly business basis like their competitors.

« 5. — The efforts made by the  
« railways to revise their tariffs, and  
« bring them in line with the actual  
« costs and market conditions should be  
« encouraged with the object of obtain-  
« ing a more rational distribution of  
« traffic between the different means  
« of transport.

« The flexibility required in the face

« of competition should be authorised  
« and facilitated in relation naturally  
« with the factors of the specific costs  
« which must be taken into account.

« 6. — In the field of the tariffs, the  
« first objective should be first of all to  
« cover the costs separately in each of  
« the two sections « passenger » and  
« « freight ». »



# OFFICIAL INFORMATION

ISSUED BY THE

## PERMANENT COMMISSION

OF THE

### International Railway Congress Association.

#### List of questions on the agenda of the 17th Session (Madrid, 1958).

*(List drawn up at the Enlarged Meeting of the Permanent Commission of the 4th June 1956, held at The Hague-Scheveningen.)*

#### SECTION I :

##### WAY AND WORKS.

1. Problems presented by the ageing of bridges and viaducts. Long term effects of fatigue and corrosion in steel bridges and weathering of masonry.

Rational methods of maintenance of bridges.

Repair and strengthening.

2. Very long rails. Welding methods. Transport of long welded rails and necessary equipment for transporting, laying, fixing, ballast, tamping, etc.

Economic aspect of the question. Present tendencies.

#### SECTION II :

##### LOCOMOTIVES AND ROLLING STOCK.

3. Design and improvement of railcars and multiple-unit Diesel trains, as regards:

— traction power equipment (location and suspension of the engine, type of transmission);

— characteristics of the construction (body and bogies);

— weight reduction;

— sound-proofing, heating, ventilation, air conditioning (supply of power required, advantages and drawbacks);

— buffer and traction gear. Inter-communication.

4. Comparative study of the periodical maintenance and repair of electric locomotives, in particular as regards :

— the wear of the tyres (influence of the wheel diameter, the axle-load, the speed, the type of bogies and eventually undulatory wear of the rails, etc.);

— the maintenance of traction motors and their transmission (flash at the

collectors and methods of coping with it, use of roller bearings for the suspension of the motors and the hollow shafts, etc.);

- lubricants used (classical and such new types as bisulphide of molybdenum);
- wear of the friction strips of the pantographs.
- Kind of work and periodicity.
- Organisation of the maintenance and influence of common user (banalisation) of the locomotives.
- Prime cost in relation to the type of equipment and the age of the engines.

### SECTION III :

#### WORKING.

5. a) Handling facilities in the goods depots for consignments in less than carloads, containers. General arrangement of the depots. Liaisons between the staff of the depot and the delivery services.

b) Railway problems regarding the introduction of general palletisation of packages.

6. When changing over to electric and Diesel traction for passenger train services, research of the principles which may lead to a rational and efficient organisation of same.

For this purpose to :

- work out the social and economic needs and with this object in view, classify the passenger services according to the needs of the populations served,

the distances, the volume of passenger traffic and its variations;

- fix for each category the traffic hours and advisable frequencies as well as the reasonable requirements of the public for comfort and speed;
- define the most suitable methods to draw up the timetables (including eventually regular interval train services) : choice of the type of train and rolling stock, fixing the runs.

### SECTION IV :

#### GENERAL.

7. Advantage of the use of high speed electronic apparatus for certain administrative work such as :

- 1) the making out of pay slips;
- 2) traffic and stores accounts;
- 3) the checking of the movement of empty and loaded freight wagons, thereby improving the distribution of rolling stock;
- 4) compiling more rapidly already existing statistics, thus having also the possibility of preparing new ones.

8. Financing and conserving railway properties and assets.

Study and comparison for limited companies, partially state-owned companies and State Railways, of the financial means used for the normal renewal of installations and rolling stock.

Forms of amortisation and renewal, taking into account for the latter, the slow or speedy depreciation of the currency.

## SECTION V :

**LIGHT RAILWAYS  
AND COLONIAL RAILWAYS.**

9. Experience obtained concerning the undulatory wear of rails.

— Damaging effects on the track, bridges, viaducts and tunnels, and on the rolling stock.

— Research into the causes of this kind of wear.

— Measures taken to avoid or to remedy it.

10. In view of the development of light

railways, what are the means to be adopted in order to reduce the operating costs of these railways and what are the resulting basic amendments?

— Delimitation of electrification and dieselisation in relation to the traffic, capital costs and operating costs.

— Co-ordination between rail and road :

— Possibilities of mixed rail-road vehicles and of specialised vehicles for rail or road.

— Principles to be followed in regard to investment, in order to improve the returns from the capital available for the transport industry.

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# Rules and Regulations of the International Railway Congress Association.

JUNE 1956.

## Objects, headquarters and constitution of the Association.

ARTICLE 1. — The object of the International Railway Congress Association is to facilitate the progress and development of railways by the holding of periodical Congresses and by means of publications.

The headquarters of the Association are at Brussels.

ART. 2. — The Association is composed of State Railway Administrations, and of Administrations directly concerned with the working of railways of public utility in countries which have joined the Association.

It is composed of the Railway Administrations included in the list which has been published in the Bulletin of the Railway Congress of September 1922, p. 1274.

The Governments of the countries to which the Association extends may also join the Association.

The list of these countries (see appendix) may be altered by a decision of the Permanent Commission, as stated in article 4.

International Organisations which deal essentially with railway operation may be admitted as adherents of the Association, as may also National Unions of railways not belonging to the Association operating either a minimum mileage of 5 000 kilometres (3 107 miles), or a mileage at least equal to 10 per cent of the total railway network of the country.

## Permanent Commission.

ART. 3. — The Association acts through a Permanent Commission composed of members nominated according to article 6.

ART. 4. — The Permanent Commission can, by a postal vote, giving a majority of three quarters of the total membership, alter the list of countries belonging to the Association.

It has power to arrange for the admission of Organisations in a position to belong to the Association and of Railway Administrations, subject to a written report prepared by a member nominated in each case by the President.

The only Railway Administrations who may be admitted to the Association, beyond those who constituted it in 1922, are those whose principal business is the running of railways worked by mechanical traction, whether owned or leased by a public authority, open for public traffic and having a length of at least 100 kilometres (62 miles) open for traffic and average receipts per annum, over the last three years of at least two million gold francs <sup>(1)</sup>.

Administrations cease to belong to the Association if they fall within either of the following categories:

a) Undertakings which enter into liquidation or default and Railway Administrations which cease to operate their lines directly in the public service;

b) Members who have not paid their subscriptions for more than two years and who, having been duly notified, have not paid the arrears;

c) Railway Administrations admitted subsequently to the formation of the Association in 1922, which no longer fulfil the conditions laid down in the 3rd paragraph of this article.

The admission of an Administration in a State which itself is only provisionally included in the Association, under the terms of the 1st paragraph of this article, remains provisional until the admission of the State itself is confirmed.

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<sup>(1)</sup> In calculating the length of line, sections of mountain railway worked by special methods of haulage are taken as equivalent to twice their length.

ART. 5. — The Commission shall organise the Congress meetings, prepare an agenda for discussion, be responsible for their preliminary treatment, edit and publish reports for the discussions, draw up a balance sheet, fix, subject to article 17, the amount of the annual subscriptions, be responsible for the finances, and set on foot any investigations and issue any reports or other publications which will, in its judgment, further the objects of the Association.

ART. 6. — The Permanent Commission shall be composed of ex-Presidents of the sessions of the Congress, ex-officio members, of elected members, the number of which shall be fixed by each Congress, and of Members of Honour and Honorary Presidents.

The elected members shall be, as far as possible, chosen to represent the different Nations. Under no circumstances, shall any one Nation have more than nine elected members.

The Members of Honour are chosen amongst the elected members of the Permanent Commission, when they have been serving permanently on the Permanent Commission for at least 20 years.

In exceptional cases, the Congress will have the right to confer the title of Member of Honour to former members who, though not fulfilling the above conditions, will have rendered exceptional services to the Association.

One third of the elected members shall retire at each Congress and shall be eligible for re-election.

Members who have ceased to hold office of any kind, so that they are no longer attached to the railway service of an adherent Government, to an adherent Organisation or to a participating Administration, which qualified them at the time of their election, shall cease to be members of the Permanent Commission. It shall be the duty of such a member at once to inform the President when he retires. The Permanent Commission may, upon the application of five members, with the consent of the majority of all its members consulted by letter, ask him to remain until the next Congress.

The past Presidents of the Association may be appointed Honorary Presidents.

The mandates of Honorary Presidents and of Members of Honour are conferred for life.

The Commission shall always have the power to complete its number by co-opting delegates of the participating Administrations and adherent Governments. In this case, a final election shall be made at the following Congress.

When the place of meeting of a Congress has been fixed, the Permanent Commission shall have power to co-opt as temporary members, representatives of the country in which the Congress is to be held.

ART. 7. — The Permanent Commission shall elect from among its members a president and two vice-presidents at its first meeting after each Congress of the Association.

The president and one of the vice-presidents shall be chosen from the Belgian members.

The Commission shall appoint a general secretary, a secretary-treasurer and secretaries. As such they shall have the right to attend the meetings in a consultative capacity.

The Commission shall be summoned by the President when the business of the Association requires it, but in any case at least once a year.

A meeting may be held when demanded by any five members.

Questions shall be decided by the votes of the majority of members present. If the votes are equal, the Chairman shall have the casting vote.

Minutes shall be kept of the proceedings of the Commission. Nine members shall form a quorum.

If at a first meeting this number is not present, the meeting shall be adjourned for not longer than one month, when it shall then be considered valid whatever may be the number of members present.

ART. 8. — The Association shall be represented in Courts of Justice and in all civil actions by the president, or in the event of his being unable to attend, by the general secretary of the Permanent Commission.

#### Executive Committee.

ART. 9. — At its first meeting after a Congress the Permanent Commission shall nominate three of its members, who, with the president and the vice-presidents of the

Commission, shall form an Executive Committee.

The president of the Permanent Commission shall also be president of the Executive Committee.

The general secretary, the secretary-treasurer and the secretaries of the Commission shall be members of the Committee, and shall have the right to take part in discussions, but not to vote.

The members of the Executive Committee shall hold office for a period equal to the interval between two Congresses. They shall be eligible for re-election.

The Executive Committee shall meet at the instigation of the president on his own authority or at the request of three members.

The Committee shall be responsible for the management of current affairs and for financial business, also for superintending and managing investigations, reports and publications; for the editing of the *Bulletin* and for the care of the library and archives. It shall decide as to printing in whole or in part the reports and other documents submitted to a Congress, the circulation of which it regards as necessary to facilitate the discussions. It shall be the duty of the Committee to furnish members of the Association with such special information as they may require.

The Committee shall have the right to appoint and to dismiss the staff.

The carrying out of the decisions of the Committee is entrusted to the president and the general secretary.

### Congresses.

ART. 10. — At each Congress the Association shall fix the time and place for the following Congress.

The Permanent Commission may alter such arrangements under exceptional circumstances.

ART. 11. — The following shall have a right to attend the meetings:

1) The members of the Permanent Commission, the secretaries and the secretary-treasurer;

2) Delegates appointed by the participating Administrations and adherent Governments and Organisations.

These must belong to the regular and permanent staff of the delegating Administration;

3) The secretaries of sections, and the reporters appointed by the Permanent Commission or by the Executive Committee to report on the items on the agenda.

ART. 12. — The participating Railway Administrations shall be entitled to nominate a number of delegates in proportion to the mileage of their system in the following ratio:

One delegate for lines of not more than 200 km. (124 miles);

Two delegates for lines of 200 to 500 km. (124 to 311 miles)

One additional delegate for each additional 500 km. (311 miles) or fraction thereof above 500 up to 3 000 km. (1 864 miles);

One additional delegate for each additional 1 000 km. (621 miles) or fraction thereof above 3 000 up to 6 000 km. (1 864 up to 3 728 miles);

One additional delegate per 2 000 km. (1 242 miles) or fraction thereof above 6 000 up to 10 000 km. (3 728 up to 6 214 miles);

One additional delegate per 4 000 km. (2 485 miles) or fraction thereof above 10 000 km. (6 214 miles).

The adherent Governments and Organisations may nominate delegates to a maximum number of 10 in the proportion of one delegate for each 100 gold francs subscription up to 500 gold francs, and one additional delegate for each 250 gold francs over 500 gold francs.

The maximum figures quoted above do not include those members who take part in the Congresses in accordance with the 1st and 3rd paragraphs of article 11, and whom the participating Administrations, or adherent Governments and Organisations include amongst their delegates.

All delegates participate in the Congresses with equal rights.

ART. 13. — At the opening of each Congress the officers of the Permanent Commission shall hold office temporarily, and the Congress immediately elect its own officers as follows:

1) One or more honorary presidents and vice-presidents;



2) One president;

3) One or more general secretaries and one or more assistant secretaries.

The presidents of sections, elected as explained in article 14 following, shall also be included.

The delegate nominated first by each government shall be an ex-officio vice-president.

All officers shall be appointed for the duration of the Session.

The election shall take place according to the rules laid down in article 16, paragraph 6. The duties of the officers shall be those laid down by standing orders adopted by deliberative assemblies for the conduct of their proceedings.

After the appointment of the officers, the Congress shall resolve itself into sections, according to the arrangements of items on the agenda submitted by the Permanent Commission.

A member may enter his name for more than one section.

The Congress may also appoint special committees to investigate certain questions.

ART. 14. — Each section or committee shall appoint its own officers consisting of :

1) A president;

2) One or more vice-presidents;

3) One or more principal secretaries and secretaries.

The principal secretaries of each section or committee, however, shall be nominated by the Permanent Commission.

The sections and the special committees shall cease with the termination of each session.

ART. 15. — The discussions of the Congress shall be confined to the questions set down in the agenda for the session by the Permanent Commission. The latter may receive suggestions, either as regards the inclusion of a question or relating to a particular question already raised by participants or adherents.

A reporter appointed by the Permanent Commission, shall prepare a brief outline of each question placed on the agenda, together with a résumé of the documents he has been

furnished with; he will not draw up the final summary.

No question shall be discussed at a general meeting without having been first considered by a section or special committee.

ART. 16. — The discussions shall be conducted in French and in the language of the country in which the Congress is held. Speeches in any other language shall be translated into French.

The minutes and reports shall be drawn up in French, but speakers on demand shall be entitled to have their original words reproduced.

The officials of the respective sections shall draw up an abstract of the discussions setting forth the various opinions expressed in the section. After receiving the approval of the section these abstracts shall be submitted to the general meeting. They shall then be inserted in the minutes after having been completed by the addition, if necessary, of any new opinions expressed at the general meeting itself.

The Congress shall not vote except on questions of management or organisation.

On these special questions, the votes of the majority of the members present shall be taken by members rising in their places. If there is any doubt the votes shall be counted. A roll call shall not be held except at the request of not less than twelve members.

### Subscriptions and auditing of accounts.

ART. 17. — The expenses of the Congresses, of the Permanent Commission and of the Executive Committee shall be covered by :

1) The annual subscription of members;

2) Subsidies and other casual receipts.

The annual subscription shall consist of :

a) In the case of adherent Governments and Organisations, such an amount as they may decide, but which in the case of member Organisations shall not be less than 200 gold francs;

b) For the member Administrations, a fixed sum of 200 gold francs plus a sum proportionate to the length of the system. This variable sum is fixed by the Permanent Commission, but may not exceed the third of a gold franc per kilometre.

The financial year shall begin on the 1st January.

ART. 18. — Payment of the subscriptions entitles participating Administrations, Governments and adherent Organisations to receive free as many copies of reports, of the proceedings and other publications as the number of their delegates.

ART. 19. — The Permanent Commission shall present to each Congress a report on the financial position. The Congress shall appoint two auditors to pass the accounts.

### **Revision of the constitution, dissolution and liquidation.**

ART. 20. — The rules may be revised by the Congress on the proposal of the Permanent Commission, due notice being given to the participants and adherents by a letter sent out at least two months before the opening of the session.

Proposals for modifications put forward by participants or adherents must reach the Permanent Commission at least six months before the opening of the session. If they are adopted by the Commission, they are submitted to the Congress by means of a report sent out by the Commission, which should be despatched to the participants and adherents at least two months before the opening of the session.

If the Permanent Commission does not accept a proposed modification, it shall not be submitted to the Congress, unless it is supported in writing by participating Administrations or adherent Governments or Organisations entitled to be represented by 100 delegates at the Congress. In this case the proposition is submitted to the participants and adherents by a letter from the Permanent Commission sent out at least two months before the opening of the session.

ART. 21. — Every proposal for amending the rules shall be discussed by the Congress on a report of a special committee presided over by the President of the Permanent Commission, or by his delegate and composed of eleven members, as follows:

a) The President of the Permanent Commission or his delegate;

b) Four members delegated by the Permanent Commission;

c) One delegate from each of the five sections which form the Congress, this dele-

gate being chosen after discussion of the suggestion by the section;

d) One delegate representing the authors of the suggestion.

ART. 22. — The proposed modification shall only be considered if it is supported by the clear majority of the delegates present at the general meeting.

The modification shall not be finally adopted until a written ballot has been taken, which shall be called for by a circular letter sent out by the Permanent Commission during the month following the termination of the session of the Congress. In this ballot each Administration, Government or Organisation belonging to the Association shall have a number of votes equal to the number of the delegates to which it is entitled.

The ballot shall be closed six months after the termination of the session of the Congress.

Only those modifications will be adopted which are supported by two-thirds of the votes received at headquarters of the Permanent Commission by the end of this period.

The results of the ballot will be published in the monthly *Bulletin* of the Association.

ART. 23. — Adherent Governments and Organisations, also participating Administrations constituting the Association pledge themselves to promote the meetings of the Congress and the work of the Permanent Commission.

ART. 24. — The Association may be dissolved only by a three quarters majority, on a postal vote from the participating Administrations, each one having a number of votes equal to that of the delegates to which it is entitled.

ART. 25. — In the event of dissolution, the Permanent Commission shall have authority to arrange the liquidation.

The assets of the Association are to be distributed by its agency among works conforming with the objects of the Association or among philanthropic works in connection with railways.

ART. 26. — In no circumstances shall participating Administrations and adherent Governments and Organisations who for any reason have ceased to belong to the Association, have any claim on the assets of the Association.

# LIST OF COUNTRIES

included in the International Railway Congress Association.

---

Argentina;	Germany;	Nicaragua;
Australia;	United Kingdom of Great	Norway;
Austria;	Britain and Northern Ire-	Pakistan;
Belgium and Colony;	land and dependent Over-	Paraguay;
Bolivia;	seas territories;	Peru;
Brazil;	Greece;	Poland;
Bulgaria;	Haiti;	Portugal and Overseas ter-
Burma;	Hungary;	ritories;
Cambodia;	India;	Rumania;
Canada;	Indonesia;	Salvador;
Ceylon;	Iran;	Siam;
Chile;	Iraq;	Spain;
China;	Ireland (Republic);	Sudan;
Colombia;	Italy;	Sweden;
Costa Rica;	Japan;	Switzerland;
Cuba;	Jugoslavia;	Syria;
Czechoslovakia;	Lebanon;	Turkey;
Denmark;	Luxemburg;	Union of South Africa;
Dominica (Republic);	Mexico;	Union of Soviet Socialist
Ecuador;	Kingdom of the Netherlands	Republics;
Egypt;	(Netherlands, Suriname,	United States of America;
Finland;	the Netherlands Antilles	Uruguay;
France, and French Union;	and New Guinea);	Viet-Nam.
	New Zealand;	

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## Passenger car center of gravity.

### How to determine it and why.

(*Railway Locomotives and Cars*, March, 1956.)

The first question that naturally arises on determining the center of gravity of a passenger car is, « Why do it at all? » There are several good reasons. Among them are :

- to obtain proper spring load distribution in order to get the desired static deflection on all springs;

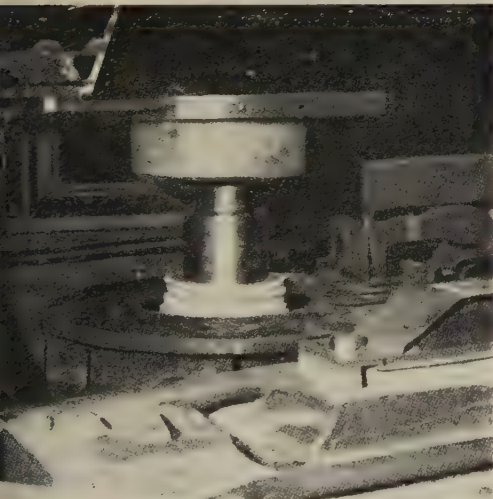
- to avoid overloading individual wheels or journals. While merely weighing each end of the car on track scales gives the total weight at rail for each truck, the determination of the center of gravity gives the weight distribution on each side;

- to know how much roll may be expected on curves at high speed, and what top speed may be safely allowed.

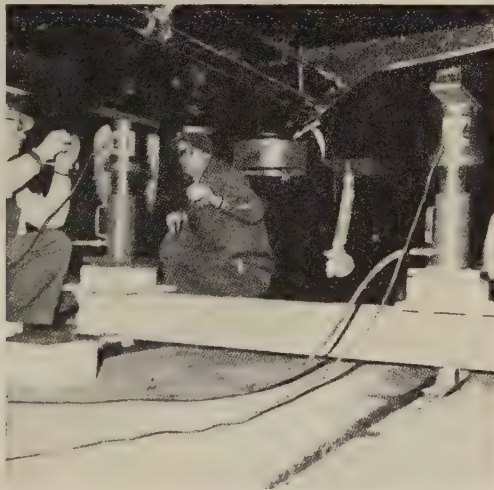
All of these considerations are becoming increasingly important in giving the pas-

senger a good ride at high speed. Of course, the center of gravity (c.g.) location can be determined by laborious calculations, but a final check on the completed car is desirable. The space location of the c.g. of a car has now been simplified by rolling the car and utilizing Baldwin electronic load cells. The method was developed by W. E. Burdick, engineer of tests, General Steel Castings, with the suggestion to roll the car originated by E. H. Weston, assistant superintendent of motive power of the Chicago & North Western.

The method consists of supporting the car body on a ball joint engaged in the kingpin opening on one end with the other end of the car supported on load cells resting on lifting jacks at the side bearings or jacking pads. With the car



One end of the car is placed on a ball seat (with adapter) while the other end rests on two load cells (right). The seat of the load cell has a leaded insert to enable it to conform to the



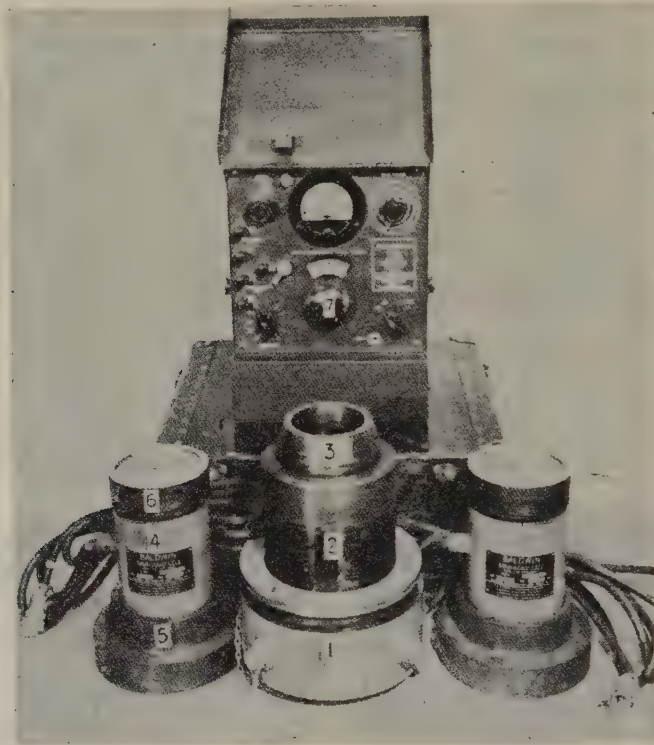
surface of the lifting jack. The top of the cell has a 4-in. spherical radius, the bottom of the bearing block, or cap, a 5-in. spherical radius, a combination found to give the best rolling action.

body thus supported on the three points, plumb lines are dropped at either end, between the collision posts, to establish a vertical plane of reference. Lined targets are placed under the plumb bobs.

The car is first brought to level position by checking the plumb lines, and the

the weight on each load cell are taken each time the car is tipped enough for the bob to travel about  $\frac{1}{2}$  inch. This procedure is continued until the bob has moved a total distance of 4 in. to the left.

The jack on the left is then raised, and the right one lowered and  $\frac{1}{2}$  in. incre-



Weighing equipment required consists of: Ball seat (1), Ball seat riser (2), King pin opening guide block (3), Two 50 000 lb capacity load cells (4), Load cells seats (5), Load cell bearing blocks (6), and Strain indicator (7).

weights on the load cells are read on a strain indicator. The load cells are calibrated so that one micro-inch of strain read on the indicator is equivalent to  $12\frac{1}{3}$  lb load.

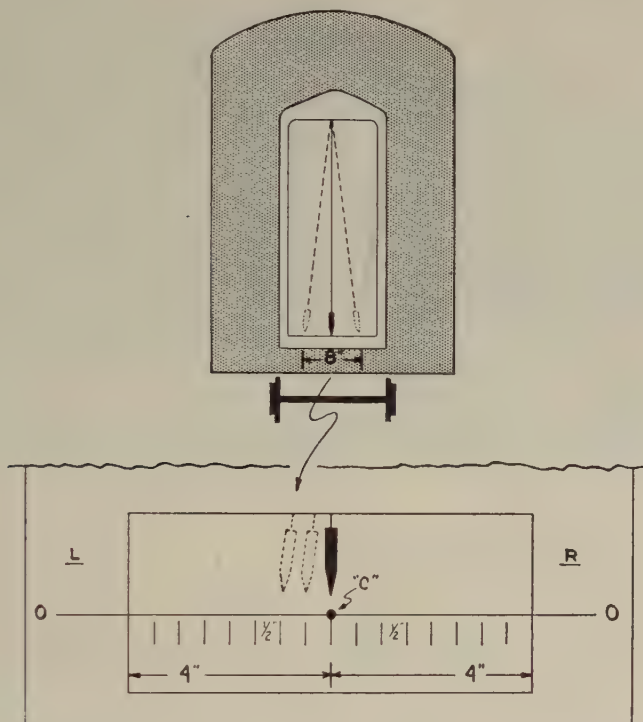
The car is rolled first to the left and then to the right by raising one jack and lowering the other, keeping the longitudinal centerline level. Readings of

ment readings continued until the bob has moved back through center point C and on to 4 in. to the right. Movement of the jacks is again reversed until the car is leveled with the plumb bob over C. All of the load cell and plumb bob readings are tabulated.

The tabulated readings are extended to show, first, the difference between right

and left load cells, and secondly, their sum. The difference is plotted against the plumb bob readings as shown on the attached graph. A hysteresis loop results due to the frictional drag of the supports

Three significant intersection points are taken from the graph — the load difference with the car level, and with the car tilted 4 in. to the left and 4 in. to the right. These points are used in the later calcula-



As the plumb bob hangs in a true vertical line it naturally moves relative to the car floor as the car is tilted (top). During the procedure, the car body is tilted enough to either side of level that the bob travels 4 in. either way from the mid-point (center). Readings are taken on both load cells each time the car is tilted enough to advance the travel of the plumb bob another  $\frac{1}{2}$  in. in the direction desired, as shown in the bottom view which is an enlarged view of the target over which the plumb bob swings. With care the plumb bob may be read to .02 in. to be consistent with the accuracy of the load cells which are within 125 lb.

opposing the rolling action. The mid-axis of this loop represents the true value of the load shift as the car is rolled. The angle of roll is of course the travel of the plumb bob divided by the plumb line length.

For convenience the values are carried as micro-inches in the tabulations and graphs and finally converted to pounds by multiplying by 12.5.

After one end of the car is thus weighed, the operation is repeated at the other end.



### Calculations not complicated.

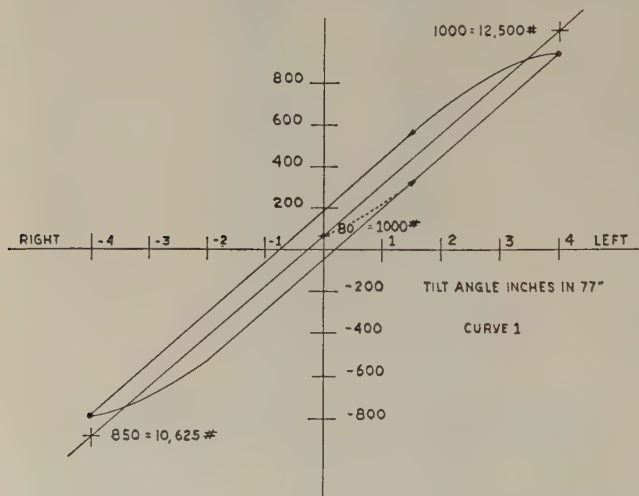
Weight and c.g. of the car body are determined as follows :

1. Average of the sum of the load cell weights at each end represents the weight carried by that truck;

2. The longitudinal location of the c.g. from the « A » end  $X = \frac{W_B}{W} m$ , where

tilted from the extreme right to left positions.

The greater the load transference, the higher is the center of gravity from the axis of rotation. As the car is rolled it is constrained to rotate about an axis. One end of this axis is the center of the ball seat and the other is the intersection of the longitudinal center-line of the car with a line joining the radius centers of the



Plot of the differences of the left and right side load cell readings on the « A » end. By using the axis of the hysteresis loop that results, the errors that would otherwise be introduced by frictional resistance are effectively eliminated.

$W_B$  is weight on B truck,  $W$  is total weight of car body, and  $m$  is distance between truck centers;

3. The transverse location of the c.g. from the centerline,  $Y = \frac{W_L - W_R}{W} n$ , where

$W_L - W_R$  is the difference between left and right loads, with car level, as taken from the graph, and  $n$  is half the transverse distance between load cells. From calculations for each end, a cross check of the accuracy of the operation is obtained;

4. The vertical location of the c.g. is determined by obtaining the total transference of load from the graph, as the car is

load cell bearing surfaces. The c.g. height above the axis of rotation is  $Z = \frac{Tn l}{Wd}$

where :

$T$  = total load transference;

$n = \frac{1}{2}$  transverse centers of load cells;

$l$  = length of plumb line;

$W$  = total weight of car body;

$d$  = total plumb line travel to produce  $T$ .

Adding the height of the axis of rotation above the rail to  $Z$  tells how high the c.g. is above the rail. The accompanying box shows a sample set of calculations for locating the c.g. in the three different planes.



GALLERY CAR CENTER OF GRAVITY

The recently delivered gallery suburban cars for both the C&NW and SP were weighed and the center of gravity determined as outlined in this article. The graph of weight differences shown was obtained from one of the SP cars. (The tables of individual weight readings on each side, from which the figures were obtained, is not shown.) To illustrate the method, the following calculations are shown for this car based on the data obtained :

Truck centers = . . . . . 714 in. = m  
1/2 cross centers of load cells = . . . 29 in. = n  
Plumb line length = . . . . . 77 in. = I

Loads cells under side bearings on truck centerline. Ball seat in king pin opening of opposite truck.

Weight of car body at « A » End,  
 $W_A = . . . . . 4\,152 \times 12.5 = 51\,900 \#$   
Weight of car body at « B » End,  
 $W_B = . . . . . 4\,308 \times 12.5 = 53\,850 \#$

Total weight of car body,  $W = 105\,750 \#$

Car weighed at . . . . « A » End « B » End  
Difference, car level (see  
Graph) . . . . . 1 000 # 625 #  
Average,  $W_L - W_R . . . . . 812 \#$

Car tilted 4 in. :  
in 77 in. to left . . . . 12 500 # 12 125 #  
in 77 in. to right . . . . 10 625 10 875  
23 125 23 000  
Average, T . . . . . 23 062 #

Center of gravity location :  
Longitudinally,  
 $X = \frac{W_B}{W} m = \frac{53\,850}{105\,750} \times 714 = 363.58 \text{ in.}$   
(From « A » End)

Transversely,  
 $Y = \frac{W_L - W_R}{W} n = \frac{812 \times 29}{105\,750} = 0.222 \text{ in.}$   
(Left of centerline)

Vertically,  
 $Z = \frac{Tn\,I}{Wd} = \frac{23\,062 \times 29 \times 77}{105\,750 \times 8} = 60.87 \text{ in.}$   
(Above axis of rotation)

Axis of rotation above rail = . . . 22.19 in.  
Center of gravity above rail = . . . 83.06 in.

This car was also weighed at each end on track scales as a double check. Deducting the actual weight of trucks gave the following comparison :

	« A » End	« B » End	Total
Weighed on load cells	51 900	53 850	105 750
Weighed on track scales	51 650	54 100	105 750

# CORRIGENDUM.

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## BULLETIN for February 1956.

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### QUESTION 1 (ENLARGED MEETING OF THE PERMANENT COMMISSION, THE HAGUE-SCHEVENINGEN, 1956.)

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*Report by Mr. V. J. M. de BLIECK.*

Page 103/9. — Fig. 5.

#### **Capital costs (in U.S. \$).**

Under « S. J. », in the last two columns;

there is : 3 000 (?) and 3 000 (?);

instead of : 1 500 and 1 500.

\* \* \*

#### **Annual maintenance costs (in U.S. \$).**

Under « S. J. », in the last two columns;

there is : 270 (?) and 270 (?);

instead of : 135 and 135.

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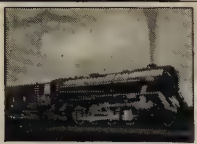
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FOR

**STEAM**

LOCOMOTIVES



FOR

**ELECTRIC**

LOCOMOTIVES



FOR

**DIESEL-  
ELECTRIC**

LOCOMOTIVES



FOR

**DIESEL-  
HYDRAULIC**

LOCOMOTIVES



FOR

**RAILCARS**

FOR

**PASSENGER  
COACHES****FOR TRUCKS**

AND

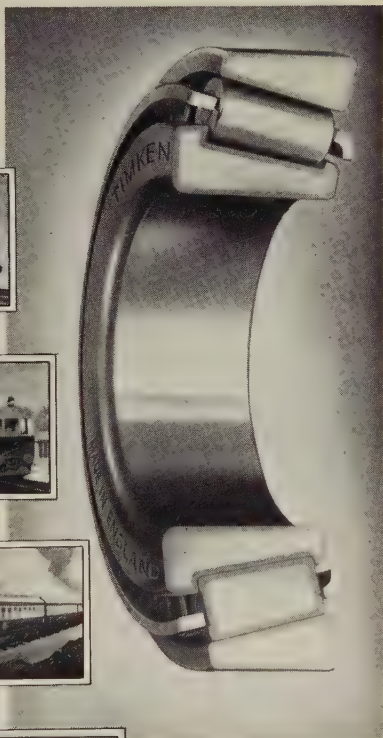
**WAGONS**

Regd. Trade Mark: TIMKEN

# TIMKEN

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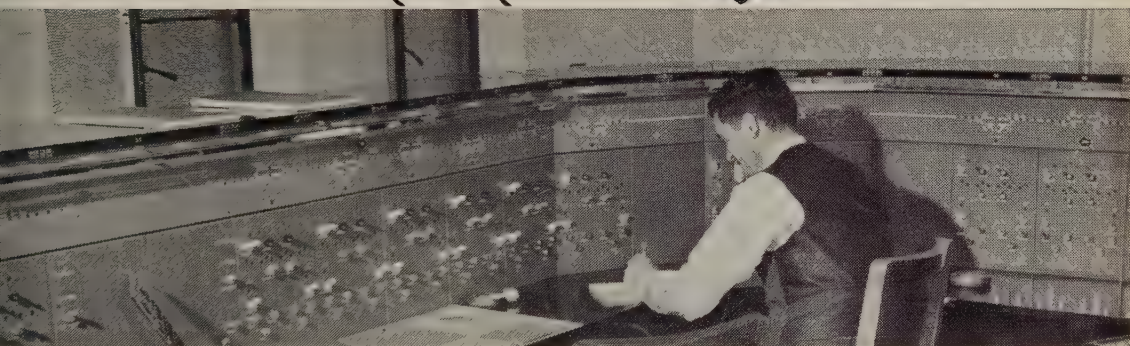
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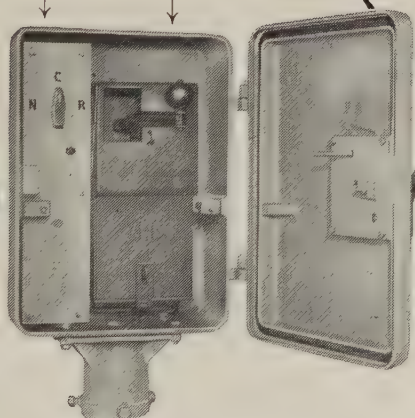
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